AMERICAN ACADEMY OF PEDIATRICS

POLICY STATEMENT
Organizational Principles to Guide and Define the Child Health Care System and/or Improve the Health of All Children

Committee on Environmental Health

Lead Exposure in Children: Prevention, Detection, and Management

ABSTRACT. Fatal lead encephalopathy has disappeared and blood lead concentrations have decreased in US children, but approximately 25% still live in housing with deteriorated lead-based paint and are at risk of lead exposure with resulting cognitive impairment and other sequelae. Evidence continues to accrue that commonly encountered blood lead concentrations, even those less than 10 μg/dL, may impair cognition, and there is no threshold yet identified for this effect. Most US children are at sufficient risk that they should have their blood lead concentration measured at least once. There is now evidence-based guidance available for managing children with increased lead exposure. Housing stabilization and repair can interrupt exposure in most cases. The focus in childhood lead-poisoning policy, however, should shift from case identification and management to primary prevention, with a goal of safe housing for all children. ***Pediatrics*** **2005;116:1036–1046;** ***child, lead, environmental exposure, chelation therapy, succimer, cognition, clinical trials, housing, prevention, behavior.***

ABBREVIATIONS. CDC, Centers for Disease Control and Prevention; AAP, American Academy of Pediatrics; EPA, Environmental Protection Agency; CNS, central nervous system; EP, erythrocyte protoporphyrin; EDTA, ethylenediaminetetraacetic acid; TLC, Treatment of Lead-Exposed Children; HUD, Department of Housing and Urban Development.

BACKGROUND

In 1991, when 1 in 11 US children had a blood lead concentration greater than 10 μg/dL, both the Centers for Disease Control and Prevention (CDC) and the American Academy of Pediatrics (AAP) recommended that all US children have their blood lead concentration measured at around 1 and 2 years of age, when concentrations increase and then peak. By 1997, the median blood lead concentration in the United States had decreased, and screening in some areas with newer housing turned up few cases of elevated blood lead concentration. The CDC and AAP then began to recommend screening only those children with a greater chance of having an elevated blood lead concentration—those in older housing, those who had a sibling or playmate with an elevated blood lead concentration, or those who had lived in or visited a structure that might contain deteriorated, damaged, or recently remodeled lead-painted surfaces. Screening of all children eligible for Medicaid, among whom were found 80% of those with increased blood lead concentration,[1] continued to be recommended and had been required by Health Care Financing Administration (now the Centers for Medicare and Medicaid Services) regulation since 1989.

This new policy statement replaces the 1998 statement and includes discussion of new data, including:

- Reliable estimates of the percentage of the US homes containing lead hazards[2];
- Results from a large clinical trial showing that chelation in children with moderately elevated blood lead concentrations does not improve cognitive or neuropsychologic test scores[3];
- Documentation of unacceptably low screening rates among Medicaid-eligible children[4];
- Further confirmation of the link between lead exposure in early childhood and delinquent behavior during adolescence[5,6]; and
- New data showing inverse associations between blood lead concentrations less than 10 μg/dL and IQ.[7,8]

The best approach to lead poisoning is to prevent exposure in the first place, but it will be years before that goal is realized. In the meantime, case finding, case management, and prevention of additional exposure will still be required. This document considers relevant aspects of the epidemiology, clinical toxicology, prevention, and treatment of lead exposure in young children and provides recommendations for pediatricians as well as public health authorities.

DECLINE OF LEAD POISONING IN THE UNITED STATES

Lead is an element and occurs naturally, but blood lead concentrations are quite low in the absence of industrial activities.[9] In the United States, there were historically 2 major sources of industrially derived lead for children: airborne lead, mostly from the combustion of gasoline containing tetraethyl lead; and leaded chips and dust, mostly from deteriorating lead paint. Both contribute to soil lead. A steep decrease in exposure to airborne lead in the United States has occurred since 1980. Federal legislation in the 1970s removed lead from gasoline and decreased smokestack emissions from smelters and other sources, causing blood lead concentrations in children to decrease. From 1976 to 1980, before the regulations had their full effect, US children 1 to 5 years

doi:10.1542/peds.2005-1947
PEDIATRICS (ISSN 0031 4005).

of age had a median blood lead concentration of 15 μg/dL.[10] In 1988–1991, the median was 3.6 μg/dL[11]; in 1999, the median was 1.9 μg/dL.[12] Although concentrations have decreased in all children, black children and poor children continue to have higher blood lead concentrations. Airborne lead should no longer be a source of community exposure in the United States, but individual counties sometimes still exceed airborne lead regulations, and continued vigilance is warranted. Individual children may still be exposed to airborne lead in fumes or respirable dust resulting from sanding or heating old paint, burning or melting automobile batteries, or melting lead for use in a hobby or craft.

SOURCES OF LEAD EXPOSURE

Lead Paint, Dust, and Soil

The source of most lead poisoning in children now is dust and chips from deteriorating lead paint on interior surfaces.[13] Children who developed lead encephalopathy with blood lead concentrations more than 100 μg/dL often had chips of lead paint visible on abdominal plain films. Children who live in homes with deteriorating lead paint, however, can achieve blood lead concentrations of 20 μg/dL or greater without frank pica.[14] The use of leaded paint on interior surfaces ceased in the United States by the mid-1970s. However, in 1998, of the 16.4 million US homes with ≥1 child younger than 6 years, 25% still had significant amounts of lead-contaminated deteriorated paint, dust, or adjacent bare soil ("lead hazard").[2] Dust and soil are also a final resting place for airborne lead from gasoline and dust from paint. Lead in dust and soil can recontaminate cleaned houses[15] and contribute to elevating blood lead concentrations in children who play on bare, contaminated soil.[16]

Transplacental Exposure and Lead in Human Milk

Lead crosses the placenta, and the blood lead concentration of the infant is similar to that of the mother.[17] The source of lead in the infant's blood seems to be a mixture of approximately two thirds dietary and one third skeletal lead, as shown by studies that exploited the differences in lead isotopes stored in the bones of women migrating from Europe to Australia.[18] Although lead appears in human milk, the concentration is closer to plasma lead and much lower than blood lead, so little is transferred. Because infant formula and other foods for infants also contain lead, women with commonly encountered blood lead concentrations who breastfeed their infants expose them to slightly less lead than if they do not breastfeed.[19] In Mexico, giving women supplemental calcium during lactation resulted in a small (less than 2 μg/dL) decrease in the mother's blood lead concentration, presumably by decreasing skeletal resorption.[20] Theoretically, this could diminish transfer of lead through breast milk even further. In the United States, however, where calcium intake may be higher, calcium supplementation does not prevent bone loss during lactation[21] and, thus, might not affect lead transfer at all.

Other Sources

Lead plumbing (in Latin, "plumbus" = lead) has contaminated drinking water for centuries, and lead in water can contribute to elevated blood lead concentrations in children.[13] In 2003–2004, some tap water in Washington, DC, was found to exceed Environmental Protection Agency (EPA) regulations. This was thought to be caused by a change in water disinfection procedures, which increased the water's ability to leach lead from connector pipes between the water mains and interior plumbing in old houses. The extent of this problem in Washington and other cities is not yet known. Affected families are drinking filtered or bottled water until the pipes can be replaced. (Most bottled water is not fluoridated; its consumption may lead to marginal fluoride intakes in children.) Much more about lead in drinking water is available on the EPA Web site (www.epa.gov/safewater/lead/index.html).

Table 1 includes questions about less common sources of lead exposure, which include hobbies, contaminated work clothes, ceramics, cosmetics, imported canned foods, etc. Such questions may be useful if a child has an elevated blood lead concentration but no exposure to leaded dust or soil. They have not been validated for the purpose of deciding whether to screen.

The lead concentration of blood for transfusion is not routinely measured. After exchange transfusion in the extremely low birth weight infant, 90% of the infant's blood is donor blood. Bearer et al[22] recommended that only units with lead concentrations of less than 0.09 μmol/L be used in these patients, on the basis of their adaptation of the World Health Organization tolerable weekly intake from ingestion to intravenous injection. Approximately one third of the units of blood that they measured were above this concentration. The effect of lead in transfused blood used in older children has not been considered.

TOXICITY OF LEAD

Subclinical Effects

At the levels of lead exposure now seen in the United States, subclinical effects on the central nervous system (CNS) are the most common effects. The best-studied effect is cognitive impairment, measured by IQ tests. The strength of this association and its time course have been observed to be similar in multiple studies in several countries.[23] In most countries, including the United States, blood lead concentrations peak at approximately 2 years of age and then decrease without intervention. Blood lead concentration is associated with lower IQ scores as IQ becomes testable reliably, which is at approximately 5 years of age.[23] The strength of the association is similar from study to study; as blood lead concentrations increase by 10 μg/dL, the IQ at 5 years of age and later decreases by 2 to 3 points. Canfield et al[7] recently extended the relationship between blood lead concentration and IQ to blood lead concentrations less than 10 μg/dL. They observed a decrease in IQ of more than 7 points over the first 10 μg/dL of

TABLE 1. Suggested Clinical Evaluation for Lead Exposure

- Medical history
  - Ask about
    - Symptoms
    - Developmental history
    - Mouthing activities
    - Pica
    - Previous blood lead concentration measurements
    - Family history of lead poisoning
  - Environmental history
  - Paint and soil exposure
    - What is the age and general condition of the residence or other structure in which the child spends time?
    - Is there evidence of chewed or peeling paint on woodwork, furniture, or toys?
    - How long has the family lived at that residence?
    - Have there been recent renovations or repairs to the house?
    - Are the windows new?
    - Are there other sites at which the child spends significant amounts of time?
    - What is the condition/make-up of indoor play areas?
    - Do outdoor play areas contain bare soil that may be contaminated?
    - How does the family attempt to control dust and dirt?
  - Relevant behavioral characteristics of the child
    - To what degree does the child exhibit hand-to-mouth activity?
    - Does the child exhibit pica?
    - Are the child's hands washed before meals and snacks?
  - Exposures to and behaviors of household members
    - What are the occupations of adult household members?
    - What are the hobbies of household members? (Fishing, working with ceramics or stained glass, and hunting are examples of hobbies that involve risk for lead exposure.)
    - Are painted materials or unusual materials burned in household fireplaces?
  - Miscellaneous
    - Does the home contain vinyl miniblinds made overseas and purchased before 1997?
    - Does the child receive or have access to imported food, cosmetics, or folk remedies?
    - Is food prepared or stored in imported pottery or metal vessels?
    - Does the family use imported foods in soldered cans?
- Nutritional history
  - Take a dietary history
  - Evaluate the child's iron status by using the appropriate laboratory tests
  - Ask about history of food stamps or participation in the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC)
- Physical examination
  - Pay particular attention to the neurologic examination and the child's psychosocial and language development

lifetime average blood lead concentration. Bellinger and Needleman[8] subsequently reported a similarly steep slope in a reanalysis of data from their study of children with blood lead concentrations similar to those in the Canfield et al study. To confirm the adverse effects of lead on IQ at these concentrations, however, more children whose blood lead concentration has never been more than 10 μg/dL should be studied. A reanalysis of the primary data from several of the prospective studies is underway to help resolve this issue. At the moment, however, these data have not yet been incorporated into policy, and the CDC[16] and AAP[24] both currently use 10 μg/dL (Table 2) as the blood lead concentration of concern.

Other aspects of brain or nerve function, especially behavior, also may be affected. Teachers reported that students with elevated tooth lead concentrations were more inattentive, hyperactive, disorganized, and less able to follow directions.[25,26] Additional follow-up of some of those children[25] showed higher rates of failure to graduate from high school, reading disabilities, and greater absenteeism in the final year of high school.[27] Elevated bone lead concentrations are associated with increased attentional dysfunction, aggression, and delinquency.[28] In children followed from infancy with blood lead measurements, self-reported delinquent behavior at 15 to 17 years of age increased with both prenatal and postnatal lead exposure,[5] and bone lead, thought to represent cumulative dose, is higher in adjudicated delinquents.[6] These data imply that the effects of lead exposure are long lasting and perhaps permanent. Subclinical effects on both hearing[29] and balance[30] may occur at commonly encountered blood lead concentrations.

Although there are reasonable animal models of low-dose lead exposure and cognition and behavior,[31] the mechanisms by which lead affects CNS function are not known. Lead alters very basic nervous system functions, such as calcium-modulated signaling, at very low concentrations in vitro,[32] but it is not yet clear whether this process or some other one yet to be examined is the crucial one. Lead interferes detectably with heme synthesis beginning at blood lead concentrations of approximately 25 μg/dL.[33] Both aminolevulinate dehydratase, an early step enzyme, and ferrochelatase, which completes the heme ring, are inhibited. Ferrochelatase inhibition is the basis of an erstwhile screening test for lead poisoning that measures erythrocyte protoporphyrin (EP), the immediate heme precursor. Because it is insensitive to the lower concentrations of

TABLE 2. Summary of Recommendations for Children With Confirmed (Venous) Elevated Blood Lead Concentrations[16]

Blood Lead Concentration	Recommendations
10–14 μg/dL	Lead education
	Dietary
	Environmental
	Follow-up blood lead monitoring
15–19 μg/dL	Lead education
	Dietary
	Environmental
	Follow-up blood lead monitoring
	Proceed according to actions for 20–44 μg/dL if
	A follow-up blood lead concentration is in this range at least 3 months after initial venous test; or
	Blood lead concentration increases
20–44 μg/dL	Lead education
	Dietary
	Environmental
	Follow-up blood lead monitoring
	Complete history and physical examination
	Lab work
	Hemoglobin or hematocrit
	Iron status
	Environmental investigation
	Lead hazard reduction
	Neurodevelopmental monitoring
	Abdominal radiography (if particulate lead ingestion is suspected) with bowel decontamination if indicated
45–69 μg/dL	Lead education
	Dietary
	Environmental
	Follow-up blood lead monitoring
	Complete history and physical examination
	Lab work
	Hemoglobin or hematocrit
	Iron status
	Free EP or ZPP
	Environmental investigation
	Lead hazard reduction
	Neurodevelopmental monitoring
	Abdominal radiography with bowel decontamination if indicated
	Chelation therapy
≥70 μg/dL	Hospitalize and commence chelation therapy
	Proceed according to actions for 45–69 μg/dL
Not Recommended at Any Blood Lead Concentration	
Searching for gingival lead lines	
Evaluation of renal function (except during chelation with EDTA)	
Testing of hair, teeth, or fingernails for lead	
Radiographic imaging of long bones	
X-ray fluorescence of long bones	

ZPP indicates zinc protoporphyrin.

blood lead that are of concern now, the test is obsolete for that use; however, EP measurement is still used clinically in managing children with higher blood lead concentrations.

Clinical Effects

Children with blood lead concentrations greater than 60 μg/dL may complain of headaches, abdominal pain, loss of appetite, and constipation and display clumsiness, agitation, and/or decreased activity and somnolence. These are premonitory symptoms of CNS involvement and may rapidly proceed to vomiting, stupor, and convulsions.[34] Symptomatic lead toxicity should be treated as an emergency. Although lead can cause clinically important colic, peripheral neuropathy, and chronic renal disease in adults with occupational exposures, these symptoms are rare in children.

Reversibility

In an influential 1994 study, 154 children who were 13 to 87 months old and had blood lead concentrations between 25 and 55 μg/dL were given chelation with ethylenediaminetetraacetic acid (EDTA) and therapeutic iron when clinically indicated and then followed for 6 months. Those whose blood lead concentrations decreased the most had improved cognitive test scores independent of whether they had been given iron or chelation therapy.[35] An Australian study[36] of 375 children with longer follow-up, however, found only small and inconsistent improvement in the IQs of children

whose blood lead concentrations decreased the most. A large (780-children) randomized trial of the use of succimer in children with blood lead concentrations of 20 to 44 μg/dL, the Treatment of Lead-Exposed Children (TLC)[3] Trial, showed no benefit on cognitive or neuropsychologic testing despite an abrupt but transient decrease in the treated children's blood lead concentrations. The children were randomly assigned at approximately 2 years of age and followed with cognitive, neuropsychologic, and behavioral tests until they were approximately 5 years of age. The large size of the trial permits confident exclusion of a drug-related improvement of 2 IQ points or more. Additional follow-up at 7 years of age with more sophisticated testing still showed no advantage for the succimer-treated children.[37]

Because blood lead concentrations decreased as the children in the TLC Trial got older regardless of whether they had chelation, Liu et al[38] used the TLC data to attempt to replicate the reported relationship between decreasing blood lead concentrations and improved cognitive test scores. Test scores were unrelated to decreasing blood lead concentrations at 6 months' follow-up, but results from following the children for 36 months, when they were approximately 5 years of age, showed improved test scores with greater decreases in blood lead concentration but only in the placebo group. Additional research on whether some effective intervention can be isolated to account for this phenomenon is needed. There remains no evidence that chelation will reverse cognitive impairment, and the predominance of data is consistent with a noncausal association between decreasing blood lead concentrations and improved cognitive test scores.

COSTS OF CHILDHOOD LEAD POISONING AND BENEFITS OF PREVENTION

Cost-Benefit Analyses

The removal of lead from gasoline cost money, and it will cost more money to remove lead from housing. If childhood lead exposure, however, affects cognitive function and its consequences, such as graduating from high school, then it is plausible that it will affect social function, employment, and earnings. Several groups have estimated the long-term dollar costs of childhood lead exposure, assuming that the effect of lead on IQ is linear and permanent; they also assume a specific economic value of increased IQs. Grosse et al[39] estimated the economic benefit of the 25-year secular downward trend in childhood lead exposure in the cohort of children 2 years of age in 2000. The estimated increase in earnings for the 3.8 million children would be between $110 billion and $319 billion over their lifetimes, compared with what they would have earned if they had been exposed to 1975 lead levels. Landrigan et al[40] estimated the lifetime costs for each year's cohort of children currently exposed to lead to be $43 billion. On the cost side, Needleman[41] estimated a $10 billion cost for deleading the estimated 2 million lead-contaminated houses that existed in 1990. In 2002, a more reliable estimate is that there are 4 million such lead-contaminated houses,[2] and when adjusting for inflation (with the Consumer Price Index inflation calculator [www.bls.gov/cpi]), Needleman's estimate becomes approximately $28 billion in 2002. Combining these estimates leads to the conclusion that removing lead paint is cost-effective if it prevents even two thirds of lead exposure for any single year's cohort of 2-year-olds. Similarly, a presidential task force estimated that the net nationwide benefit of interim control of lead hazards in the nation's pre-1960 housing would be $1 billion to $9 billion over 10 years. The benefit of abating the hazards permanently would be $21 billion to $38 billion. Such quantitation allows planning and setting priorities to be done more transparently and allows comparisons to estimates of the cost for lead-abatement programs and other preventive activities. Although these are exemplary numbers in simplified analyses, all parts of which could be challenged, they illustrate the rationale for viewing lead exposure as a problem that should be solved, even on economic grounds.

Federal Strategy to Prevent Lead Poisoning

The President's Task Force on Environmental Health Risks and Safety Risks to Children was formed in 1997 by executive order. It consists of government officials from the EPA, the Department of Health and Human Services, the Consumer Product Safety Commission, the Department of Housing and Urban Development (HUD), and others. One of its first projects was to formulate a plan to eliminate childhood lead poisoning,[42] a goal that was incorporated into the Healthy People 2010 goals for the nation(www.healthypeople.gov/Document/HTML/Volume1/08Environmental.htm#_Toc490564710). For the first time, the strategy concentrated on primary prevention and was directed at housing. It did not require that a lead-poisoned child first be identified before a house was considered eligible for participation (the principle of primary prevention). The core of the strategy is a grant-based program administered by the HUD that would accelerate the pace at which in-place management of lead hazards would occur in US homes. The strategy projected that more than 20 million houses could be remediated in the decade from 2000–2010, making lead-safe housing available to a large majority of US children. The strategy also included continued screening, especially among Medicaid-eligible children, enforcement of existing statutes and regulations, and research, especially on the effectiveness of in-place management of lead hazards. The HUD plans periodic evaluations and progress reports, which can be tracked on its Web site (www.hud.gov/offices/lead).

DIAGNOSTIC MEASURES

The diagnosis of lead poisoning or increased lead absorption depends on the measurement of blood lead concentration. This is best performed by using a venous sample, but a carefully collected finger-stick sample can be used. Most blood lead measurements are now performed because the child meets some general eligibility criteria (screening) and not be-

cause they are at especially high risk of exposure or have symptoms suggestive of lead poisoning (diagnosis).

Screening

Between 1991 and 1997, both the AAP and CDC recommended universal screening, that is, that all children have their blood lead concentration measured, preferably when they are 1 and 2 years of age. Because the prevalence of elevated blood lead concentrations has decreased so much, a shift toward targeted screening has begun,[43] and the criteria for and implementation of targeted screening continues to develop. As of early 2005, the situation is as follows. All Medicaid-eligible children must be screened.[4] Medicaid will reimburse 2 screenings, one at 1 year of age and one at 2 years of age. Most children with elevated blood lead concentrations are Medicaid eligible, and most Medicaid-eligible children have not been screened.[4] The Advisory Committee on Childhood Lead Poisoning Prevention has proposed criteria by which a state could acquire an exemption from this requirement, and the proposal is under consideration in the Secretary of Health and Human Services' office. Until such exemptions are granted, both the CDC[4] and AAP support universal screening of Medicaid-eligible children. The thinking behind the availability of exemptions is not primarily to decrease the number of screenings performed but rather to increase it among groups in which increased lead absorption will be found. Children whose families participate in any assistance program but who, for whatever reason, are not eligible for Medicaid should also be screened.

For children not eligible for Medicaid, several states and some municipalities have developed targeted screening recommendations or policies using suggestions made by the CDC,[43] their own data, or some combination of the 2. All practitioners should determine if such recommendations are in place where they practice. Appropriate contacts at state and city health departments with CDC-funded programs are listed on the CDC Web site (www.cdc.gov/nceh/lead/grants/contacts/CLPPP%20Map.htm).

The approach to screening children who are not eligible for Medicaid and who live in areas in which health authorities have not made locale-specific recommendations is less clear. Although targeted screening may be desirable, well-validated tools with which to achieve it are not yet in place.[44] In the absence of policy, current recommendations support screening all children who are not enrolled in Medicaid and who live in areas in which local authorities have not issued specific guidance.

There are now many case reports of children who are recent immigrants, refugees, or international adoptees who have elevated (sometimes very elevated) blood lead concentrations.[45] Such children should be screened on arrival in the United States.

Diagnostic Testing

Some experienced clinicians measure the blood lead concentration in children with growth retardation, speech or language dysfunction, anemia, and attentional or behavioral disorders, especially if the parents have a specific interest in lead or in health effects from environmental chemicals. However, a persistent elevation of blood lead concentration into school age is unusual, even if peak blood lead concentration at 2 years of age was high and the child's housing has not been abated. This is probably because hand-to-mouth activity decreases and the child's body mass increases. Thus, a low blood lead concentration in a school-aged child does not rule out earlier lead poisoning. If the question of current lead poisoning arises, however, the only reliable way to make a diagnosis is with a blood lead measurement. Hair lead concentration gives no useful information and should not be performed.[46] Radiograph fluorescence measurement of lead in bone is available in a few research centers and has been used in children as young as 11 years with acceptable validity for research purposes,[47] but it has no clinical utility as yet.

MANAGEMENT OF CHILDREN WITH ELEVATED BLOOD LEAD CONCENTRATIONS

In 2002, the national Advisory Committee on Childhood Lead Poisoning Prevention published a monograph, "Managing Elevated Blood Lead Levels Among Young Children."[16] The goal of the monograph was to provide an evidence-based, standard approach to management usable throughout the United States. Anyone involved with the management of children with elevated blood lead concentrations needs access to it. This section is consistent with the monograph.

The management of children with elevated blood lead concentrations is determined primarily by how high the concentration is (Table 2). Children with concentrations less than 10 μg/dL are not currently considered to have excess lead exposure. Children with concentrations 10 μg/dL or greater should have their concentrations rechecked; if many children in a community have concentrations greater than 10 μg/dL, the situation requires investigation for some controllable source of lead exposure. Children who ever have a concentration greater than 20 μg/dL or persistently (for more than 3 months) have a concentration greater than 15 μg/dL require environmental and medical evaluation.

Residential Lead Exposure

Most children with elevated blood lead concentrations live in or regularly visit a home with deteriorating lead paint on interior surfaces. Some children eat paint chips, but pica is not necessary to achieve blood lead concentrations of 20 μg/dL or greater.[14] Children can ingest lead-laden dust through normal mouthing behaviors by simply placing their hand or an object in their mouth. This also happens when children handle food during eating.[48–50] There is increasing evidence that professional cleaning, paint stabilization, and removal and replacement of building components can interrupt exposure. Cooperation with the health department in investigating and decreasing the source is necessary. Although some authorities insist that moving children to unleaded

housing or removal of all lead paint from their current housing is the only acceptable solution,[51] alternative housing is rarely available and extensive on-site removal of leaded paint can raise the concentration in house dust and resident children.[52]

Lead in soil is higher around houses with exterior lead paint and in places where there has been a smokestack or other point source or heavy traffic. Soil concentrations are related to blood lead concentrations but not as closely as are interior dust lead concentrations.[13] Soil can be tested for lead content, and the EPA has guidelines for testing on its Web site (www.epa.gov/lead/leadtest.pdf). Lead should no longer be a problem in municipal water supplies, but wells, old pipes from the municipal supply to the house (as has been the case in Washington, DC), or soldered joints may add lead to water (see www.epa.gov/safewater/lead/index.html).

Other Sources

Some children will have persistently elevated blood lead concentrations without access to lead paint, bare soil, or lead in their drinking water. Their exposure may come from any of the sources listed in Table 3. Blood lead concentrations should decrease as the child passes approximately 2 years of age, and a stable or increasing blood lead concentration beyond that age is likely to be caused by ongoing exposure.

The recommended approach to environmental investigation of a child with an elevated blood lead concentration consists of (1) an environmental history, such as the one shown in Table 1, (2) an inspection of the child's primary residence and any building in which they spend time regularly, (3) measurement of lead in deteriorated paint, dust, bare soil, or water as appropriate, (4) control of any immediate hazard, and (5) remediation of the house, which may require temporary relocation of the child. If new or lead-safe housing is an option for the family, it offers a simple and permanent solution. These situations can be frightening for the families. Involving the family and providing them with information as it is obtained is the right thing to do and may help lessen anxiety.

Although intense regimens of professional cleaning decrease children's blood lead concentrations, providing families with instructions and cleaning materials does not. Washing children's hands has intuitive appeal, but no data support its role in decreasing exposure. Suggested prevention strategies are listed in Table 3.

Medical Management

If the blood lead concentration is greater than 45 μg/dL and the exposure has been controlled, treatment with succimer should begin. A pediatrician experienced in managing children with lead poisoning should be consulted; these pediatricians can be found through state health department lead programs, through pediatric environmental health specialty units (www.aoec.org/pehsu.htm), at hospitals that participated in the largest clinical trial of succimer,[3] or by calling the local poison control center or the AAP Committee on Environmental Health. The most common adverse effects of succimer listed on the label are abdominal distress, transient rash, elevated hepatocellular enzyme concentrations, and neutropenia. The drug is unpleasant to administer because of a strong "rotten-egg" odor, and 40% of the families on active drug compared with 26% on placebo found the drug difficult to administer.[53] The succimer label provides dosages calculated both by body surface area and by weight, but the equivalent dose by both methods would occur in a child approximately 5 years of age. For the younger children

TABLE 3. Sources of Lead Exposure and Prevention Strategies[59]

Source	Prevention Strategy
Environmental	
Paint	Identify and abate
Dust	Wet mop (assuming abatement)
Soil	Restrict play in area, plant ground cover, wash hands frequently
Drinking water	Flush cold-water pipes by running the water until it becomes as cold as it will get (a few seconds to 2 minutes or more; use cold water for cooking and drinking
Folk remedies	Avoid use
Cosmetics containing additives such as kohl or surma	Avoid use
Old ceramic or pewter cookware, old urns/kettles	Avoid use
Some imported cosmetics, toys, crayons	Avoid use
Contaminated mineral supplements	Avoid use
Parental occupations	Remove work clothing at work; wash work clothes separately
Hobbies	Proper use, storage, and ventilation
Home renovation	Proper containment, ventilation
Buying or renting a new home	Inquire about lead hazards
Lead dust in carpet	Cover or discard
Host	
Hand-to-mouth activity (or pica)	Frequent hand washing; minimize food on floor
Inadequate nutrition	Adequate intake of calcium, iron, vitamin C
Developmental disabilities	Enrichment programs

typically given the drug, body surface area calculations give higher doses, which are those that are recommended.[54]

Although chelation therapy for children with blood lead concentrations of 20 to 44 μg/dL can be expected to lower blood lead concentrations, it does not reverse or diminish cognitive impairment or other behavioral or neuropsychologic effects of lead.[3] There are no data supporting the use of succimer in children whose blood lead concentrations are less than 45 μg/dL if the goal is to improve cognitive test scores.

Children with symptoms of lead poisoning, with blood lead concentrations higher than 70 μg/dL, or who are allergic or react to succimer will need parenteral therapy with EDTA and hospitalization. Guidelines for these circumstances are beyond the scope of this statement, but the same consultation as described above is recommended. There are academic centers that use D-penicillamine, another oral chelator used in Wilson disease, for lead poisoning. Its safety and efficacy, however, have not been established,[55] and the AAP Committee on Drugs considers it to be a third-line drug for lead poisoning.[56]

Dietary Intervention

The Advisory Committee on Childhood Lead Poisoning Prevention reviewed the evidence for dietary intervention in lead-exposed children.[16] They concluded that there are no trial data supporting dietary interventions aimed specifically at preventing lead absorption or modulating the effects of lead. However, there are laboratory and clinical data suggesting that adequate intake of iron, calcium, and vitamin C are especially important for these children. Adequate iron and calcium stores may decrease lead absorption, and vitamin C may increase renal excretion. Although there is epidemiologic evidence that diets higher in fat and total calories are associated with higher blood lead concentrations at 1 year of age,[57] the absence of trial data showing benefits and the caloric requirements of children at this age preclude recommending low-fat diets for them.

Psychological Assessment

The Advisory Committee on Childhood Lead Poisoning Prevention reviewed the evidence for psychological assessment and intervention in lead-exposed children.[16] Despite data from several large epidemiologic studies suggesting that moderate exposure to lead produces specific deficits in attention or executive functions, visual-spatial skills, fine-motor coordination, balance, and social-behavioral modulation,[58] there is no specific "signature" syndrome yet identified. In addition, although 2-year-olds tend to have the highest blood lead concentrations, they will usually not have detectable cognitive damage, which can be expected to become more apparent at 4 years of age and later. It seems reasonable to manage children whose blood lead concentration is 20 μg/dL or greater at its peak as having a higher risk of developmental delay and behavior abnormalities.[16] Because the effects emerge later, after the child's blood lead concentration will have decreased, the child's record must be kept open even after the blood lead concentration has decreased.

Although there is not specific literature supporting the use of enrichment programs in lead-poisoned children, programs aimed at children with delay from another cause should be effective in lead-poisoned children.

RECOMMENDATIONS FOR PEDIATRICIANS

1. Provide anticipatory guidance to parents of all infants and toddlers about preventing lead poisoning in their children. In particular, parents of children 6 months to 3 years of age should be made aware of normal mouthing behavior and should ascertain whether their homes, work, or hobbies present a lead hazard to their toddler. Inform parents that lead can be invisibly present in dust and can be ingested by children when they put hands and toys in their mouths.
2. Inquire about lead hazards in housing and child care settings, as is done for fire and safety hazards or allergens. If suspicion arises about the existence of a lead hazard, the child's home should be inspected. Generally, health departments are capable of inspecting housing for lead hazards. Expert training is needed for safe repair of lead hazards, and pediatricians should discourage families from undertaking repairs on their own. Children should be kept away from remediation activities, and the house should be tested for lead content before the child returns.
3. Know state Medicaid regulations and measure blood lead concentration in Medicaid-eligible children. If Medicaid-eligible children are a significant part of a pediatrician's practice or if a pediatrician has an interest in lead poisoning, he or she should consider participating in any deliberations at the state and local levels concerning an exemption from the universal screening requirement.
4. Find out if there is relevant guidance from the city or state health department about screening children not eligible for Medicaid. If there is none, consider screening all children. Children should be tested at least once when they are 2 years of age or, ideally, twice, at 1 and 2 years of age, unless lead exposure can be confidently excluded. Pediatricians should recognize that measuring blood lead concentration only at 2 years of age, when blood lead concentration usually peaks, may be too late to prevent peak exposure. Earlier screening, usually at 1 year of age, should be considered where exposure is likely. A low blood concentration in a 1-year-old, however, does not preclude elevation later, so the test should be repeated at 2 years of age. Managed health care organizations and third-party payers should fully cover the costs of screening and follow-up. Local practitioners should work with state, county, or local health authorities to develop sensitive, customized questions appropriate to the housing and hazards encountered locally.
5. Be aware of any special risk groups that are prevalent locally, such as immigrants, foreign-born

adoptees, refugees, or children whose parents work with lead or lead dust in their occupation or hobby and, of course, those who live in, visit, or work on old houses.
6. In areas with old housing and lead hazards, encourage application for HUD or other moneys available for remediation.
7. Keep current with the work of the national Advisory Committee on Childhood Lead Poisoning Prevention and any relevant local committees. Although there is now evidence that even lower blood lead concentrations may pose adverse effects to children, there is little experience in the management of excess lead exposure in these children. Although most of the recommendations concerning case management of children with blood lead concentrations of 15 μg/dL should be appropriate for children with lower concentrations, tactics that decrease blood lead concentrations might be expected to be less and less effective as they are applied to children with lower and lower blood lead concentrations.

RECOMMENDATIONS FOR GOVERNMENT

1. Identify all children with excess lead exposure, and prevent further exposure to them. The AAP supports the efforts of individual states to design targeted screening programs, even for Medicaid children. However, the goal must be to find all children with excess exposure and interrupt that exposure, not simply to screen less. To do this, state and local government activities must focus on the children who are most at risk, which requires more and better data about the prevalence of elevated blood lead concentrations in specific communities. Prevalence estimates based on convenience samples or clinic attendees are not reliable and should not be used as the basis of policy.
2. Realize that case-finding per se will not decrease the risk of lead poisoning. It must be coupled with public health programs including environmental investigation, transitional lead-safe housing assistance, and follow-up for individual cases. Lead-screening programs in high-risk areas should be integrated with other housing and public health activities and with facilities for medical management and treatment.
3. Continue commitment to the Healthy People 2010 goal of eliminating lead poisoning by 2010. The AAP supports the current plan with emphasis on lead-safe housing. Continued monitoring and commitment will be necessary. Research findings on low-cost methods of remediating housing have become controversial. The federal government should support impartial scientific and ethical inquiry into the best way to carry out the needed research.
4. Minimize the further entry of lead into the environment. Regulations concerning airborne lead should be enforced, use of lead in consumer products should be minimized, and consideration should always be given to whether a child might come into contact with such a product.
5. Encourage scientific testing of the many simple, low-cost strategies that might decrease lead exposure. Examples include hand-washing and use of high chairs. Exploration of innovative, low-technology tactics should be encouraged, perhaps through the use of special study sections or review groups. Educational resources for parents and landlords need to be developed and tested.
6. Require coverage of lead testing for at-risk children by all third-party payers by statute or regulation.
7. Fund studies to confirm or refute the finding that blood lead concentrations of less than 10 μg/dL are associated with lower IQ. The next important step in lead research is conducting of studies in which confounding by socioeconomic factors is not so strong. Funding of studies in this area needs to be given high priority, as was done in the early 1980s when the question of effects of blood lead concentrations less than 20 μg/dL was raised.
8. Gather the nationally representative data necessary for a rational public health response to the problem of childhood lead poisoning. The federal government should continue measuring children's blood lead concentrations in the National Health and Nutrition Surveys to allow national estimates of exposure and should periodically resurvey housing to measure progress in the reduction of lead-paint hazards. In addition, state governments can improve monitoring of trends among screened children by supporting electronic reporting of blood lead test results to the CDC.

REFERENCES

1. General Accounting Office. *Lead Poisoning: Federal Health Care Programs Are Not Effectively Reaching At-Risk Children.* Washington, DC: General Accounting Office; 1999. Publication GAO-HEHE-99-18

* *Lead author*

2. Jacobs DE, Clickner RP, Zhou JY, et al. The prevalence of lead-based paint hazards in U.S. housing. *Environ Health Perspect.* 2002;110: A599–A606
3. Rogan WJ, Dietrich KN, Ware JH, et al. The effect of chelation therapy with succimer on neuropsychological development in children exposed to lead. *N Engl J Med.* 2001;344:1421–1426
4. Advisory Committee on Childhood Lead Poisoning Prevention. Recommendations for blood lead screening of young children enrolled in Medicaid: targeting a group at high risk. *MMWR Recomm Rep.* 2000; 49(RR-14):1–13
5. Dietrich KN, Ris MD, Succop PA, Berger OG, Bornschein RL. Early exposure to lead and juvenile delinquency. *Neurotoxicol Teratol.* 2001;23: 511–518
6. Needleman HL, McFarland C, Ness RB, Fienberg SE, Tobin MJ. Bone lead levels in adjudicated delinquents. A case control study. *Neurotoxicol Teratol.* 2002;24:711–717
7. Canfield RL, Henderson CR Jr, Cory-Slechta DA, Cox C, Jusko TA, Lanphear BP. Intellectual impairment in children with blood lead concentrations below 10 μg per deciliter. *N Engl J Med.* 2003;348:1517–1526
8. Bellinger DC, Needleman HL. Intellectual impairment and blood lead levels [letter]. *N Engl J Med.* 2003;349:500–502
9. Patterson CC, Ericson J, Manea-Krichten M, Shirahata H. Natural skeletal levels of lead in *Homo sapiens sapiens* uncontaminated by technological lead. *Sci Total Environ.* 1991;107:205–236
10. Mahaffey KR, Annest JL, Roberts J, Murphy RS. National estimates of blood lead levels: United States, 1976–1980. Association with selected demographic and socioeconomic factors. *N Engl J Med.* 1982;307:573–579
11. Pirkle JL, Brody DJ, Gunter EW, et al. The decline in blood lead levels in the United States. The National Health and Nutrition Examination Surveys (NHANES). *JAMA.* 1994;272:284–291
12. Centers for Disease Control and Prevention. Blood lead levels in young children—United States and selected states, 1996–1999. *MMWR Morb Mortal Wkly Rep.* 2000;49:1133–1137
13. Lanphear BP, Matte TD, Rogers J, et al. The contribution of lead-contaminated house dust and residential soil to children's blood lead levels. A pooled analysis of 12 epidemiologic studies. *Environ Res.* 1998;79:51–68
14. Charney E, Sayre J, Coulter M. Increased lead absorption in inner city children: where does the lead come from? *Pediatrics.* 1980;65:226–231
15. Farfel MR, Chisolm JJ Jr. An evaluation of experimental practices for abatement of residential lead-based paint: report on a pilot project. *Environ Res.* 1991;55:199–212
16. Centers for Disease Control and Prevention. *Managing Elevated Blood Lead Levels Among Young Children: Recommendations From the Advisory Committee on Childhood Lead Poisoning Prevention.* Atlanta, GA: Centers for Disease Control and Prevention; 2002. Available at: www.cdc.gov/nceh/lead/CaseManagement/caseManage_main.htm. Accessed September 16, 2004
17. Graziano JH, Popovac D, Factor-Litvak P, et al. Determinants of elevated blood lead during pregnancy in a population surrounding a lead smelter in Kosovo, Yugoslavia. *Environ Health Perspect.* 1990;89:95–100
18. Gulson BL, Mizon KJ, Korsch MJ, Palmer JM, Donnelly JB. Mobilization of lead from human bone tissue during pregnancy and lactation—a summary of long-term research. *Sci Total Environ.* 2003;303:79–104
19. Gulson BL, Jameson CW, Mahaffey KR et al. Relationships of lead in breast milk to lead in blood, urine, and diet of the infant and mother. *Environ Health Perspect.* 1998;106:667–674
20. Hernandez-Avila M, Gonzalez-Cossio T, Hernandez-Avila JE, et al. Dietary calcium supplements to lower blood lead levels in lactating women: a randomized placebo-controlled trial. *Epidemiology.* 2003;14: 206–212
21. Kalkwarf HJ, Specker BL, Bianchi DC, Ranz J, Ho M. The effect of calcium supplementation on bone density during lactation and after weaning. *N Engl J Med.* 1997;337:523–528
22. Bearer CF, Linsalata N, Yomtovian R, Walsh M, Singer LT. Blood transfusions: a hidden source of lead exposure [letter]. *Lancet.* 2003;362: 332
23. Pocock SJ, Smith M, Baghurst P. Environmental lead and children's intelligence: a systematic review of the epidemiological evidence. *BMJ.* 1994;309:1189–1197
24. American Academy of Pediatrics, Committee on Environmental Health. Screening for elevated blood lead levels. *Pediatrics.* 1998;101:1072–1078
25. Needleman HL, Gunnoe C, Leviton A, et al. Deficits in psychologic and classroom performance of children with elevated dentine lead levels [published correction appears in *N Engl J Med.* 1994;331:616–617]. *N Engl J Med.* 1979;300:689–695
26. Sciarillo WG, Alexander G, Farrell KP. Lead exposure and child behavior. *Am J Public Health.* 1992;82:1356–1360
27. Needleman HL, Schell A, Bellinger D, Leviton A, Allred EN. The long-term effects of exposure to low doses of lead in childhood: an 11-year follow-up report. *N Engl J Med.* 1990;322:83–88
28. Needleman HL, Riess JA, Tobin MJ, Biesecker GE, Greenhouse JB. Bone lead levels and delinquent behavior. *JAMA.* 1996;275:363–369
29. Schwartz J, Otto D. Lead and minor hearing impairment. *Arch Environ Health.* 1991;46:300–305
30. Bhattacharya A, Shukla R, Bornschein RL, Dietrich KN, Keith R. Lead effects on postural balance of children. *Environ Health Perspect.* 1990;89: 35–42
31. Rice D. Behavioral effects of lead: commonalities between experimental and epidemiologic data. *Environ Health Perspect.* 1996;104(suppl 2): 337–351
32. Markovac J, Goldstein GW. Picomolar concentrations of lead stimulate brain protein kinase C. *Nature.* 1988;334:71–73
33. McIntire MS, Wolf GL, Angle CR. Red cell lead and δ-amino levulinic acid dehydratase. *Clin Toxicol.* 1973;6:183–188
34. Chisolm JJ Jr, Kaplan E. Lead poisoning in childhood—comprehensive management and prevention. *J Pediatr.* 1968;73:942–950
35. Ruff HA, Bijur PE, Markowitz M, Ma YC, Rosen JF. Declining blood lead levels and cognitive changes in moderately lead-poisoned children. *JAMA.* 1993;269:1641–1646
36. Tong S, Baghurst PA, Sawyer MG, Burns J, McMichael AJ. Declining blood lead levels and changes in cognitive function during childhood: the Port Pirie Cohort Study. *JAMA.* 1998;280:1915–1919
37. Dietrich KN, Ware JH, Salganick M, et al. Effect of chelation therapy on the neuropsychological and behavioral development of lead-exposed children following school entry. *Pediatrics.* 2004;114:19–26
38. Liu X, Dietrich KN, Radcliffe J, Ragan NB, Rhoads GG, Rogan WJ. Do children with falling blood lead levels have improved cognition? *Pediatrics.* 2002;110:787–791
39. Grosse SD, Matte T, Schwartz J, Jackson RJ. Economic gains resulting from the reduction in children's blood lead in the United States. *Environ Health Perspect.* 2002;110:563–569
40. Landrigan PJ, Schecter CB, Lipton JM, Fahs MC, Schwartz J. Environmental pollutants and disease in American children: estimates of morbidity, mortality, and costs for lead poisoning, asthma, cancer, and developmental disabilities. *Environ Health Perspect.* 2002;110:721–728
41. Needleman HL. The future challenge of lead toxicity. *Environ Health Perspect.* 1990;89:85–89
42. President's Task Force on Environmental Health Risks and Safety Risks to Children. *Eliminating Childhood Lead Poisoning: A Federal Strategy Targeting Lead Paint Hazards.* Washington, DC: Government Printing Office; 2000
43. Centers for Disease Control and Prevention. *Screening Young Children for Lead Poisoning: Guidance for State and Local Public Health Officials.* Atlanta, GA: Centers for Disease Control and Prevention; 1997
44. Binns HJ, LeBailly SA, Fingar AR, Saunders S. Evaluation of risk assessment questions used to target blood lead screening in Illinois. *Pediatrics.* 1999;103:100–106
45. Geltman PL, Brown MJ, Cochran J. Lead poisoning among refugee children resettled in Massachusetts, 1995 to 1999. *Pediatrics.* 2001;108: 158–162
46. Esteban E, Rubin CH, Jones RL, Noonan G. Hair and blood as substrates for screening children for lead poisoning. *Arch Environ Health.* 1999;54: 436–440
47. Todd AC, Buchanan R, Carroll S, et al. Tibia lead levels and methodological uncertainty in 12-year-old children. *Environ Res.* 2001;86:60–65
48. Freeman NC, Sheldon L, Jimenez M, Melnyk L, Pellizari ED, Berry M. Contribution of children's activities to lead contamination of food. *J Expo Anal Environ Epidemiol.* 2001;11:407–413
49. Freeman NC, Ettinger A, Berry M, Rhoads G. Hygiene- and food-related behaviors associated with blood lead levels of young children from lead-contaminated homes. *J Expo Anal Environ Epidemiol.* 1997;7:103–118
50. Melnyk LJ, Berry MR, Sheldon LS, Freeman NC, Pellizari ED, Kinman RN. Dietary exposure of children in lead-laden environments. *J Expo Anal Environ Epidemiol.* 2000;10:723–731
51. Rosen J, Mushak P. Primary prevention of lead poisoning—the only solution. *N Engl J Med.* 2001;344:1470–1471
52. Farfel MR, Chisolm JJ Jr. Health and environmental outcomes of traditional and modified practices for abatement of residential lead-based paint. *Am J Public Health.* 1990;80:1240–1245
53. Treatment of Lead-Exposed Children (TLC) Trial Group. Safety and efficacy of succimer in toddlers with blood lead levels of 20–44 μg/dL. *Pediatr Res.* 2000;48:593–599
54. Rhoads GG, Rogan WJ. Treatment of lead-exposed children. [letter]. *Pediatrics.* 1996;98:162–163

55. Shannon M, Graef JW, Lovejoy FH Jr. Efficacy and toxicity of D-penicillamine in low-level lead poisoning. *J Pediatr.* 1988;112:799–804
56. American Academy of Pediatrics, Committee on Drugs. Treatment guidelines for lead exposure in children. *Pediatrics.* 1995;96:155–160
57. Gallicchio L, Scherer RW, Sexton M. Influence of nutrient intake on blood lead levels of young children at risk for lead poisoning. *Environ Health Perspect.* 2002;110:A767–A772
58. Dietrich KN, Berger O, Bhattacharya A. Symptomatic lead poisoning in infancy: a prospective case analysis. *J Pediatr.* 2000;137:568–571
59. American Academy of Pediatrics, Committee on Environmental Health. *Pediatric Environmental Health.* 2nd ed. Elk Grove Village, IL: American Academy of Pediatrics; 2003

All policy statements from the American Academy of Pediatrics automatically expire 5 years after publication unless reaffirmed, revised, or retired at or before that time.

Michigan Lead Safe Partnership

Testimony to the
Michigan Childhood Lead Poisoning Prevention and Control Commission

October 24, 2005

In our testimony at the Commission's August 2, 2005 Hearing we briefly discussed the critical goal of eliminating childhood lead poisoning in Michigan by the Year 2010; and urged increased blood lead testing and reduction of residential lead hazards. A recent editorial by one of the country's leading lead poisoning researchers is worthy of repetition here:

The key to primary prevention is to require screening of high-risk, older housing units to identify lead hazards before a child is poisoned—before occupancy and after renovation or abatement. Voluntary recommendations will inevitably fail. Screening and follow-up testing of high risk children will remain an important part of lead poisoning prevention programs, but would serve as a safety net, not the focus. Unfortunately, public health and housing agencies lack the resources they need to protect children from lead poisoning, and even when they do act . . . that is too little too late.[1]

Specific Action Steps for the Commission: The Michigan Lead Safe Partnership encourages the Commission to act, or recommend actions by others, during the following intervals:

Immediate Action

- Michigan intends to achieve its goal of eliminating childhood lead poisoning by 2010; but not all available state resources have been involved in this effort. Numerous state agencies should be enlisted to avoid many 'missed opportunities' for reaching the goal. When a similar situation faced the federal government several years ago, a Presidential Task Force [2] which was convened to challenge each agency's mission, policies and programs, proved to be extremely beneficial. Michigan's kids deserve a comparable effort by state agencies. The Commission should request the Governor to create a Michigan Inter-Agency Children's Lead Poisoning Elimination Task Force, by Executive Order, or ask the legislature to do so by statute;
- To fully inform the Commissioners, and the public, of recent program enhancements, the Commission should request the Michigan Department of Community Health for a report about the status of implementation of the seven priority recommendations made by the Governor's Task Force and any barriers to their accomplishments;
- The Commission should recommend that the Governor's Executive Budget for FY 06/07 include full funding for implementation of the seven priority recommendations mentioned immediately above;

- As in our August testimony, we reiterate our suggestion that the Commission urge legislative action to adopt House Bill 728 so that selective blood lead level information can be added to the Michigan Childhood Immunization Registry;
- Throughout the state, older commercial and industrial structures are being converted for residential use such as apartments, lofts and condominiums, with no requirement that lead hazards be identified. MLSP is now seeking sponsors for a bill to require a risk assessment by a state certified risk assessor before occupancy of these structures. We encourage the Commission to endorse 'in concept' the development and adoption of a bill with these provisions.

Short Term Actions

- Several recent laws have now been in effect for nearly a year; and the appropriate legislative committees should conduct oversight hearings to determine progress in implementation, barriers to progress and suggestions for amendments if those are needed, so that achievement of the original objectives intended by the legislators can be achieved. The Commission should communicate this proposal to the chairpersons of the appropriate legislative committees; and suggest scheduling of early oversight hearings;
- As highlighted in Dr. Bruce Lanphear's editorial in the May 11, 2005 Journal of the American Medical Association, entitled '*Childhood Lead Poisoning: Too Little, Too Late,*' lead hazards must be identified before children are poisoned. MLSP is now seeking legislative sponsors for a proposed 10 year lead hazard reduction law, similar to a statute in the State of Maryland. We encourage the Commission to endorse 'in concept' the development and adoption of a bill with these provisions.

References

1. "Childhood Lead Poisoning Prevention: Too Little, Too Late." Lanphear, BP. Journal of the American Medical Association. May 11, 2005; 293:2274-2275.

2. "Eliminating Childhood Lead Poisoning: A Federal Strategy Targeting Lead Paint Hazards." President's Task Force on Environmental Health Risks and Safety Risks to Children, February 2000.

MICHIGAN LEAD SAFE PARTNERSHIP
18581 Jamestown Circle
Northville, MI 48168

October 24, 2005

Dr. Kimberlydawn Wisdom, Chairperson and Commissioners
Michigan Childhood Lead Poisoning Prevention and Control Commission
Department of Community Health
3423 North Martin Luther King Jr. Boulevard
P.O. Box 30195
Lansing, Michigan 48909

Dear Dr. Wisdom and Commissioners:

For the Commission's second public hearing, as suggested in our August 2, 2005 letter to you, we are now offering supplemental testimony. With our state goal of eliminating childhood lead poisoning by 2010, the time for policy development, planning, legislation, resource commitment and program implementation is very short.

Please see the enclosed MLSP Statement for additional specific action steps that our members encourage the Commission to adopt. Since over 3000 young Michigan children were identified as lead poisoned last year, with only fifteen percent tested, the need for urgent action is evident.

Also, please contact one of our co-chairs if you wish additional information on these action steps or if we can provide additional support.

Sincerely,

Glenn Brown
Partnership Chair (Southeast Michigan)

(248) 374-6075

Paul Haan
Partnership Co-Chair (West Michigan)

(616) 241-3000

Good Afternoon,

My name is Jim Helmstetter. I am the Director of Environmental Health Services at the Health Department here in Genesee County. Our Environmental Health Division manages a Lead HUD Program and a Lead Educational Outreach Program.

Lead is the greatest environmental health risk to today's young children. Lead residue from lead-based paint, leaded gasoline, lead smelting operations, and other historical uses remains in our environment to this day. Elemental lead does not break down; it will remain in the communities of Michigan until proper abatement measures are taken. In other words, lead will continue to poison our children until we, ourselves, take appropriate measures to eliminate it from the environment. Lead poisoning is not a problem that will take care of itself.

The use of lead-based paint in housing was banned in 1978. Over 90% of the housing units in Flint were constructed prior to 1979, according to the 2000 U.S. Census. HUD estimates that over 60,000 housing units in Genesee County contain lead. Lead poisoning is not just an urban issue, however, older rural homes and structures are likely to contain lead-based paint. Busy intersections and areas near highways are lead-burdened. The ground that our children play upon can contain harmful quantities of lead from past uses. Again, the lead will not disappear over time; it will remain where our ancestors have placed it until we remove it ourselves.

In adults, lead exposure has been associated with cardiovascular disease, miscarriage, nerve disorders, renal disease, and a decline in cognitive abilities. Evidence shows that lead in the bloodstream of a mother can be passed to the fetus, resulting in brain damage, or even death.

Childhood lead exposure can lead to a myriad of illnesses, including damage to the nervous system, renal system, and loss of hearing. Low-level exposure to lead during early childhood can also cause learning disabilities, attention deficit disorder, decreased intelligence, poor muscle coordination, decreased muscle and bone growth, as well as speech, language, and behavioral problems. High level exposure can cause seizures, unconsciousness, and even death. Many of the conditions caused by early childhood lead poisoning are irreversible. The long-term damage to children, their families, and society can be devastating.

We believe that the continued existence of such a risk in our homes and communities is also a social justice issue. Economic and social disparities in our communities are glaring. Primary prevention activities in high risk areas, such as those that exist in our county, serve to reduce the disparity in minority populations and the poor.

Increasing public education and awareness regarding lead paint hazards is an essential element in an effective primary prevention program. The Genesee County Health Department is attempting to increase public education on the subject through community-based organizations, mass media, and continued interaction with the public during the course of carrying out our core programs. Despite our best attempts at educating the public about lead-related hazards, interim controls, and proper cleaning methods, it appears that our efforts have not been effective enough to motivate people to actually do what is needed to minimize lead exposure until proper abatement measures are undertaken. It would be in the best interest of all stakeholders to compile and share information and experiences in order to identify the most effective education strategies for future local health department activities. A list serve for this type of information exchange should be created, maintained, and made available to health professionals and educators.

Speaking on behalf of the citizens of Genesee County, I applaud both the State's legislative efforts and assistance in finding effective ways to eliminate environmental lead from our community. Our means for enforcing recently passed legislation at the local level is somewhat ambiguous. If we are to reach the 2010 goal, local health departments need cooperation and possibly legislative assistance from the State government. In order to effectively address the issue, we request that a streamlined enforcement protocol be drafted and distributed to local health departments and county prosecutors.

When we react to a lead poisoning case, it is already too late to reverse the damage that has been done to the child. This is why our focus must be on action, primary prevention activities, not reaction. Eliminating the lead hazard from existing homes before families move in is the only way to effectively safeguard our communities, our children, and future generations from suffering further damage.

Lead poisoning is preventable and unnecessary. Resent research has shown that education and our current housing remediation strategies alone can not abate our lead hazards. Tough legislation and enforcement is needed. We ask that the State of Michigan assist us in our enforcement and educational efforts through tougher legislation and increased funding for the primary prevention of lead.

Our joint goal must be zero exposure to lead for our children and for all our citizens.

Thank you for the opportunity to speak on Primary Lead Prevention.

JH:ls:U:\jim\Testimony 10-05.doc

Testimony of
John McKellar, Director
Personal Health Division
Genesee County Health Department

Before the Childhood Lead Poisoning Prevention and Control Commission

Monday, October 24, 2005
Flint, Michigan

Good afternoon. My name is John McKellar and I am the Director of the Personal Health Division at the Genesee County Health Department.

I would like to welcome Commission members to Flint and our County, especially on this occasion of National and State Lead Poisoning Prevention Week. The Genesee County Health Department appreciates Governor Granholm's, Surgeon General Wisdom's and this Commission's focus on such an important and preventable health issue. I thank you for the opportunity to provide comment today.

My colleague, Jim Helmstetter, Director of Environmental Health Services at the Genesee County health Department, provides in his written testimony the myriad consequences of childhood lead poisoning. We are sure the choir in this room needs no preaching. Mr. Helmstetter also emphasized the importance of primary prevention and the need for clarification and support in the application of the new legal sanctions.

I would like to describe recent stepped-up activities in Genesee County to address childhood lead poisoning, and suggest that legislative and financial support for local health departments to perform similarly can have a significant impact on this issue.

- As I am speaking right now, Health Department staff are working collaboratively with local Medicaid health plans to conduct joint screening clinics at Health Department facilities. Our Medical Director, Dr. Gary Johnson, issued a letter that was mailed by the health plans to members announcing the joint effort and strongly encouraging participation.

- The Genesee County Health Department has introduced lead screening as a routine component of children's visits to our WIC clinics.

- A door-to-door education and screening campaign, in partnership with an Afrocentric community-based organization, is under way in the highest at-risk zip code in Flint, made possible by grant funding from the Michigan Department of Community Health's Health Disparities Reduction and Minority Health Program.

- The Genesee County Health Department is also in the early stages of convening a Greater Flint Lead Safe Children community coalition to maintain focus and coordination of activities.

In 2002, the Genesee County Board of Commissioners approved a comprehensive strategic plan for the Genesee County Health Department for the fiscal years 2003-2007. The overarching goal of work over the five-year period is "to improve the health status of Genesee County residents, *with particular attention to reducing racial health disparities*, through key prevention and intervention strategies." Among the ten strategies, and particularly consistent with lead poisoning prevention work, is "reduction of exposure to harmful environmental agents."

Children at the highest risk for lead poisoning are African American, living in families with low incomes, living in housing that was built prior to 1946. The 48505 zip code has been selected as the focus of our special grant-funded work because 85% of all children under age 6 years living in that zip code area are African American. Additionally, the area is one of the most impoverished areas in the City of Flint with 38% of its housing stock built before 1950. Although this area should have universal lead screening of children based on CDC guidelines, only 14.6% of all children under 6 years were screened in calendar year 2003.

There are multiple levels of influence on the low rates of lead testing in Genesee County and other communities. These include factors such as access to health care, health care provider practices (in spite of Medicaid screening requirements), patient (or in the case of young children, parent/guardian)-provider communication competence, as well as health care providers' and parents/guardians' knowledge, attitudes, and beliefs about the issue.

Lead-focused special funding to our Health Department is very much appreciated, and its continuation is essential. Other local health departments in Michigan, as well, could be called upon and financially supported to exercise their convening and collaborating expertise to marshal improved local responses to this important public health matter.

Thank you.

The Effect of Lead Poisoning on School and School District Performance: A Preliminary Examination

By

Lyke Thompson, Director
The Center for Urban Studies
College of Urban, Labor and Metropolitan Affairs
Wayne State University
Detroit, MI
Ad5122@wayne.edu

And

Dora Ion
Department of Political Science
Wayne State University
Detroit, MI

Introduction

Lead poisoning affects millions of children in the United States each year. Most of them live in urban areas. In Michigan, for example, two thirds of the estimated 20,000 children poisoned every year live in Detroit and its suburban areas. The consequences of lead poisoning include loss of intelligence, decreases in school achievements, loss of impulse control, and a range of different other impacts. Medical research has established fairly clearly that these consequences occur at the individual level. A question that still needs to be answered is whether the consequences identified for individuals are also seen at the aggregate level in locations where there are concentrations of lead poisoning cases.

Lead poisoning tends to be concentrated in older areas of central cities, because the leading cause of lead poisoning today is the decaying lead paint in houses built prior to 1978 and particularly in those built prior to 1950. The lead from the paint chips and dust formed on the floors and window sills of these old buildings reaches the blood and bones of toddlers through mouthing habits and mere inhalation, poisoning them. The same areas where lead poisoning is concentrated are also the areas of our society where schools are said to under perform. Could it be that the educational underperformance of these intercity schools is related to the large number of lead poisoning cases in the intercity areas? That is the key question that this article seeks to address.

The importance of this question stems from the fact that this country is devoting large amounts of money, increasing amounts of political will and strenuous administrative reform efforts towards its failing schools. Today, almost every possible player has been considered as the possible source of failure for these schools. Teachers,

parents, administrators, school organization and administrative superstructures have all been blamed for the failure of intercity schools at one time or another.

The governing of school districts has been totally reconfigured in some cities, based upon the belief that administrative restructuring would improve school performance. Teacher salaries and the number of children per teacher have been considered as possible causes. This article simply assesses the possibility that some portion of the problem may be associated with the housing and lead paint rather than with any aspect of the school system itself.

Literature review

Lead poisoning has been shown to cause a range of behavioral and intellectual deficits that might lead to school failures. One of the most intensively studied aspects of lead poisoning concerns its impact on intelligence, lead being shown to impair children's intelligence quotient (IQ) at all levels of exposure. Therefore, it is no longer accurate to assert that impairment due to lead occurs exclusively in children presenting clinical symptoms of lead poisoning. Impairment of intelligence occurs in asymptomatic children[1]. IQ decrements are illustrated in differences on the verbal, full scale and performance intelligence test scores between children in higher and lower levels of lead exposure[2] producing long-term and irreversible effects of early poisoning[3]. Quantitative

[1] Researchers exclude from the study children with an encephalopathy diagnostic in the past, mentally retarded and those with a history of lead poisoning.

[2] Such differences range between 3.8 and 4.6 IQ points scores in a study examining the intelligence test scores of children with various dentine lead levels (lead is considered to be more resilient in bones than in blood). Needleman et al.(1979). Deficits in Psychological and Classroom Performance of Children with Elevated Dentine Levels. *New England Journal of Medicine, 300*, 689-95.

[3] Follow-up studies demonstrate that blood lead levels measured at 24, 57 months are inversely correlated with the full scale IQ and Verbal and Performance IQ scores. Needleman, H. L., & Bellinger, M. A. (1992). Low Level Lead

estimations of the intellectual impairment indicate that an increase from 10 μg/dl to 20 μg/dl in blood lead level is associated with 2.57 points decrease in IQ[4].

Even at levels at which the possibility of encephalopathy[5] is excluded, lead has been proven to be responsible for serious intellectual impairment in children[6]. Current research has not established a threshold below which lead does not produce intelligence impairment[7]. Even though the intelligence test scores decrease gradually for lead levels below 30 μg/dl, deficits in intellectual performance are evident even at blood lead levels below 10 μg/dl BLL[8].

The effects of lead poisoning tend to persist, even after researchers control for potential variables such as socio-economic status, parental and maternal IQ coefficient or education, quality of home environment and others. Researchers generally control for potential confounding variables such as socio-economic status, parental and maternal IQ

Exposure, Intelligence and Academic Achievement – a Long-term Follow-up Study. Also, the children' s IQ scores measured on various scales at 2, 7 and at 11-13 years of age are significantly associated with postnatal lead at all ages (6,15 and 24 months). Banghurst, P., et al. (1996). Lifetime exposure to Environmental Lead and Children's Intelligence at 11-13 Years – the Port Pirie Cohort Study. *BMJ, 312*, 1569-75.

[4] This association was established by Joel Schwartz in a meta-analysis of previous studies. (1994). Low Level Lead Exposure and Children's IQ. *Environmental Research, 65*, 42-55. In their longitudinal study Banghrurst et al (1996) find that for a doubling in lifetime average blood lead concentrations at age 11-13, the mean score for full scale IQ decreases by 3.0 points.

[5] According to Lidsky and Schneider, acute encephalopathy occurs at levels above 40μg/dl. Lidsky T. and Sneider J.,(2003), Lead neurotoxicity in children: basic mechanisms and clinical correlates, *Brain*, 126:5-19.

[6] In 1981, Yule and others found that lead at levels below 33μg/dl was responsible for intelligence decrements in English children, even when social factors were controlled for. Yule W. et al. (1981) The Relationship between Blood Lead Concentrations, Intelligence and Attainment in a School Population: A Pilot Study, *Develop. Med. Child. Neurol.*, 23, 567.

[7] Schwartz (1994) and Needleman and Gastonis (1990) especially investigated this aspect through meta-analyses. The latter found that low doses of lead exposure determine psychometric deficits in children, eliminating the previous methodological criticism regarding the selection bias, bias in markers of exposure etc. Needleman, H. L., & Gastonis, C. A. Low Level Lead Exposure and the IQ of Children: a Meta-analysis for Modern Studies. *Journal of the American Medical Association, 263*, 673-8.

[8] Such cognitive deficits are discovered in preschool children of three to five years of age. Canfield, et al. (2003). Intellectual Impairment in Children with Blood Lead Concentrations Below 10 μg/dL. *Public Health Reports, 348(16)*, 1517-26.

coefficient or education, quality of home environment and others. Evidence of a negative relationship between lead and children's intelligence test scores is not confined to the United States. Studies have found similar effects in Taiwan, Europe, and New Zealand[9].

Apart from effects on intelligence, lead is also responsible for impairing visual and fine motor coordination, leading to lower reaction times in accomplishing tasks, and eventually, to weak overall classroom performance. Inability to follow simple directions and sequences was found in higher classes of lead exposure in first and second grade children evaluated by their teachers[10], as well as in lead exposed children between the ages of 1 and 3 years old[11]. However, the prevalence of task dysfunctions combined with difficulties in concentrating seems to differ with respect to gender, being more evident in lead poisoned girls than in boys[12].

Reading dysfunctions represent specific manifestations of asymptomatic lead poisoning. These are often associated with poor language and lower IQ performance[13]

---

[9] Associations between lead and intelligence test scores of Taiwanese children are inversely correlated (r=-0.26, r=-0.19) but they lose significance after controlling for family factors. Rabinowitz, M et al. (1991). Dentine Lead and Child Intelligence in Taiwan. *Environmental Health, 46(6)*, 351-61. In Europe, Winneke et al. (1990) found a weak but significant relationship between lead-exposure and psychometric intelligence in an overall analysis of full sets of data from various independent studies. Winneke, et al. (1990) Results from the European Multicenter Study on Lead Neurotoxicity in Children: Implications for Risk Assessment. *Neurotoxicology and Teratology, 12*, 553-59. A study conducted in London (Yule, 1981) also found a strong association between lead exposure and intellectual performance. Similar findings were presented in a New Zealand study. Fergusson, D. M., et al. (1988). A Longitudinal Study of Dentine Lead Levels, Intelligence, School Performance and Behavior – Part II, Dentine Lead and Cognitive Ability. *Journal of Child Psychology and Psychiatry and Allied Disciplines, 29 (6)*, 793-809.

[10] Needleman et al.,1979.

[11] De la Burde, B., & Choate, M. L. (1975). Early Asymptomatic Lead Exposure and Development at School Age. *Journal of Pediatrics, 87(4)*, 638-42.

[12]However, in boys, the direction and task cluster dysfunctions is more prevalent in the highest quartile of cord blood lead. Leviton, A., et al. (1993). Pre- and Post-natal Low Level Lead Exposure and Children's Dysfunction in School. *Environmental Research, 60(1)*, 30-43.

[13] The risk of reading disability presents an odds ratio of 5 to 8 in those youngsters with dentine lead levels above 20 ppm. Needleman and Bellinger, 1990.

and are present throughout the adolescence years[14]. Overall low performance on examinations is also a common condition found in children in all categories of lead exposure, but seemingly, lead impairs reading and spelling more than mathematics abilities and performance[15]. Although lead exerts a negative effect on all aspects of a child or adolescent's school performance, reading test scores show the largest impact, even at levels of exposure below 5 μg/dl[16]. The negative effects of lead on education seem to accumulate across time so that adolescents who were highly exposed to lead at preschool ages more often leave school without qualifications and have lower levels of success on school examinations[17]. Moreover, in this context of low overall academic performance, the risk of absenteeism and the dropout rates increase [18]. The odds ratio of leaving school without graduating for youngsters with lead levels higher than 20 ppm is estimated at about 7 to 4[19].

Lead is also associated with a series of behavioral problems that affect school performance directly and indirectly. Indirectly, withdrawal and low popularity among classmates are conditions related to childhood lead poisoning, contributing to anxiety and low overall class performance[20]. Teachers report that 6-year-old lead exposed children

---

[14] Adolescents who suffered lead exposure at ages 6-7 present poorer reading abilities at 18 years of age. Fergusson, D. M., Horwood, L. J., & Lynskey, M. T. (1997). Early Dentine Lead Levels and Educational Outcomes at 18 Years. *Journal of Child Psychology and Psychiatry and Allied Disciplines, 38(4)*, 471-8.

[15] Yule, 1981.

[16] Lanphear, B. P., et al. (2000). Cognitive Deficits Associated with Blood Lead Concentrations Below 10 μg/dL in US Children and Adolescents. *Public Health Reports, 115.*

[17] Fergusson, et al., 1997.

[18] De la Burde and Choate, 1975, Fergusson, et al 1997.

[19] Needleman and Bellinger, 1990.

[20] De la Burde and Choate, 1975

exhibit internalizing behavior, accounting for a propensity to loneliness and depression[21]. Such manifestations have been found even earlier, in 2 to 5 year-old-children exposed to lead, combined with a whole range of somatic problems, encompassing sleeping dysfunctions, aggressive and schizoid behavior[22]. Lead exposure also causes low emotional regulation. This produces behavior such as high distractibility, attention deficits, hyperactivity, self-destructiveness and easy frustration[23].

Attention deficits directly impair classroom performance[24]. Elevated blood lead levels, as measured in hair samples are associated with attention deficit disorder. This relationship remains strong even after controlling for age, ethnicity, gender, and socioeconomic status and it is confirmed by attention-deficit hyperactivity disorder diagnostics in the same children[25]. Attention problems caused by lead are also associated with aggressive, impulsive and delinquent behavior over long periods of time during the school years[26]. Attention deficit disorders and aggressiveness caused by lead are related to disciplinary problems at ages of 13-14 years and to later serious anti-social behavior[27]. Also, emotional impairment due to lead exposure in the childhood years has been linked

---

[21] Bellinger, D., et al. (1994). Pre- and Post-natal Lead Exposure and Behavior Problems in School-Aged Children. *Environmental Research, 66*, 12-30.

[22] Sciarillo W. et al. (1992). Lead Exposure and Child Behavior. *American Journal of Public Health, 82*, 10.

[23] Children in the lead group (10 -24.9μg/dl) scored 15.8 points lower than children in the non-exposed group on the Behavior Rating Scale. For the Emotional Regulation Factor (hyperactive/distractible/easy frustration) and the Orientation Engagement Factor (fear/withdrawal/disinterest behaviors) their mean score was 14.6 points and 14.1 points lower than the mean scores of the children in the non-lead group. The BRS was scored as a percentile, so that lower scores reflected problematic results. Mendelsohn, et al. (1998). Low Level Lead Exposure and Behavior in Early Childhood. *Pediatrics, 101(3)*.

[24] Attention deficits are found in lead exposed children evaluated by their teachers (Needleman et al, 1979, Needleman and Bellinger, 1990, Leviton et al, 1993, Fergusson et al, 1988).

[25] Tuthill, R. (1996). Hair Lead Levels Related to Children's Classroom Attention Deficit Behavior. *Environmental Health, 51(3)*, 214.

[26] Needleman, H. L.,et al.(1996). Bone Lead Levels and Delinquent Behavior. Journal of the American Medical Association, 275 (5), 363-370

[27] Denno, D. (1990). *Biology and Violence*. New York: Cambridge University Press.

to cruel impulsive behavior later in the adolescence years[28]. Lead is strongly associated with the frequency and the gravity of offenses in male youths, predisposed to aggressive behavior, at ages 7-17; with disciplinary problems at 13-14 years of age and with criminal behavior later in adulthood at 18-22 years[29]. Evidence about delinquent behavior related to lead exposure during early childhood is strengthened by parental and children' self-reports regarding the frequency of offenses among higher lead exposed ten-year old children[30] and also among low lead exposed adolescents[31]. Drug use (marijuana consumption) is one of the most frequently reported offenses by parents and lead exposed youths.

Methods

Given the literature documenting detrimental effects, it is reasonable to argue that lead poisoning has a significant and substantial effect upon intelligence and forms of behavior linked to intelligence. Is it then also reasonable to suggest that where lead poisoning prevalence is higher, its effect will show up in the aggregate performance of children in school? The answer to this question might depend on several factors.

First and foremost, it probably depends on the share of children who are affected by lead poisoning. So, if only a small percentage of children are affected by lead poisoning and those are marginally affected, it is unlikely that there would be any effect

---

[28] Byers, R., & Lord, E. (1986). Late Effects of Lead Poisoning and Mental Development. *American Journal of Diseases of Children, 66(5)*, 471-49.

[29] Denno, 1990.

[30] Needleman, H. L.,et al.(1996). Bone Lead Levels and Delinquent Behavior. Journal of the American Medical Association, 275 (5), 363-370.

[31] Dietrich, K. et al. (2001). Early Exposure to Lead and Juvenile Delinquency. *Neurotoxicology and Teratology, 23(6)*, 511-18.

on school performance. On the other hand, if a substantial proportion of children are impacted, then the effect is more likely to be evident.

Second, the ability of statistical tools to capture any impacts that may exist also depends upon the measurements taken. There is a potential for measurement error on both the dependent variable—school performance- and on the independent variable—lead poisoning.

School performance can be measured in many ways. Here we will use two ways. First, we will use a standardized test called the MEAP, the Michigan Educational Assessment Program that is given to schoolchildren throughout Michigan annually. It is given to students at various age levels across the grade levels and is intended to measure levels of achievement of students. Here we use scores that indicate the percentage of students passing MEAP either at the district level or at the elementary school level.

Lead poisoning can be measured fairly precisely at the individual level using tests that assay the extent of lead in a child's blood. These tests measure the micrograms of lead per deciliter of blood. Here we rely upon data for individual children that have been collected through the Michigan Department of Community Health. We use data for the year 2001 and some for 2002. An important problem with this data comes from the manner in which it has been collected. Lead tests are generally done by physicians or their nurses or at laboratories. In some Michigan areas, such as Detroit, policy requires that every child be tested. In other areas, policy only recommends lead testing for children if they live in an older house or have other risk factors. In both cases, far fewer children are tested than should be the case. Only 11 percent of the children under six years of age were tested statewide during 2001. Whether these children are a

representative sample of all children at risk is unknown, and this could affect the validity of our statistical conclusions.

These lead poisoning data are collected by the Department of Community Health from laboratories and doctors across the state, and while there are data collection standards, they are not always followed. Address data necessary to geocode the lead poisoning cases to school districts or school boundaries are not always available. Therefore, a certain number of cases are lost in the geocoding process.

This study undertakes two types of analyses. First, childhood lead poisoning data was geocoded to school districts across the state of Michigan and used to predict levels of success on MEAP tests for those schools districts. This analysis, thus, considers the district as the unit of analysis and uses 2001 data. It uses elementary school MEAP scores together with lead poisoning data for all children from that district. The lead poisoning data will often take account of children of various ages, including some who are both old and younger than elementary school. Given the low lead testing rates, in most districts we would not have enough data to proceed, if we only examined elementary school students. So, the lead poisoning measure must be seen as a proxy measure, and it is somewhat inexact.

Our second analysis uses data for 2002 for the City of Detroit, where lead testing levels were approximately 33 percent. This improves the chance that data are representative of the population of children. Given the higher number of cases, we are able to concentrate on children old enough to be in elementary school, so that the match is better between the achievement testing data and the blood lead data. In this instance lead poisoning cases were geocoded to elementary school attendance areas, and lead

poisoning measures were associated with achievement scores for those elementary schools.

Two control variables were used, the percentage of economically disadvantaged children and the percentage of white students.

Results

The dependent variable in the cross sectional analysis of school districts is the percentage of students passing the MEAP tests they took. The independent variables used for this version of the analyses are the median income of the district, based upon Census data, the percentage of students who are white and the logged percentage of the districts children that tests indicate might be lead poisoned. The lead poisoned percentage is logged to adjust for a highly skewed distribution.

At the district level, the results show that the percentage of lead poisoned children in the district is the only significant predictor of MEAP scores in the equation. The direction of the effect is negative, as expected, indicating that lead poisoning tended to be associated with lower MEAP scores (see table 1). Overall, however, the equation explains 10.4 percentage of the variance, indicating that many other factors are in play here as well.

At the level of Detroit Public School system, the cross sectional analysis used two dependent variables. The first dependent variable was the MEAP passing rate for each school, while the independent variables were similar to those used in the district level analysis. These included the ratio of children with lead poisoning to the number of

students in the attendance area, the percentage of students that are economically disadvantaged, and the percentage of white students.

When the MEAP passing rate is used as the dependent variable in an ordinary least squares analysis, only the economically disadvantaged variable is significant. (See Table 2.) In this case, it turns out that the lead poisoning ratio and the percentage of economically disadvantaged children are sufficiently correlated and that the economic variable overcomes the effect of lead poisoning.

Finally, a logistic regression was estimated using as a second dependent variable whether or not the school achieved Adequate Yearly Progress, a measure defined under the No Child Left Behind Act. This is a variable that is calculated for schools but not districts. Here we used as the dependent variable an indicator variable showing when the school failed to achieve AYP in both math and reading. We used the same independent variables as in the previous analysis.

The results show that the lead poisoning ratio is the only significant predictor of failing to achieve AYP either in math or in reading (See Table 3). The overall results are significant, but achieved a r-square of only 6.1 to 9.8 percent.

Conclusions

This is a preliminary attempt to estimate whether there is a relationship between school performance and lead poisoning. Using geocoding we were able to locate lead poisoning cases in school districts and within Detroit in elementary school attendance zones. There are challenges to this procedure, both because of the low levels of testing for lead and the inability to geocode all cases to a district or school attendance area.

There are also questions as to whether school achievement tests are sufficiently precise to capture the effects of lead poisoning.

Still, in two of the three analyses conducted here lead poisoning did appear to impact MEAP scores or AYP. The importance of this is that it suggests a major alternative explanation for the failure of inner city schools. Instead of blaming that failure on teacher quality, school quality, administrative or family structures, these results open up the possibility that something is physically different about school children in older neighborhoods. They may have been poisoned to such an extent that their ability to learn is limited.

This is important in that, if it is true that lead poisoning limits school performance, it would substantially change the policy agenda for urban education. It would force schools to be concerned with the early childhood living conditions of their future pupils. It would say that educational policy is dependent at least partially on housing policy and community development. It would argue that improving schools means putting children in safe environments from birth onward. And it would eliminate the need to engage in endless discussions about school reorganizations, charter schools and vouchers. We could concentrate our policy and our discussion on actions that demonstrably increase the intelligence of children.

References:

[1] Banghurst, P., et al. (1996). Lifetime exposure to Environmental Lead and Children's Intelligence at 11-13 Years – the Port Pirie Cohort Study. *BMJ, 312*, 1569-75.

[2] Bellinger, D., et al. (1994). Pre- and Post-natal Lead Exposure and Behavior Problems in School-Aged Children. *Environmental Research, 66*, 12-30.

[3] Byers, R. & Lord, E. (1986). Late Effects of Lead Poisoning and Mental Development. *American Journal of Diseases of Children, 66(5)*, 471-49.

[4] De la Burde, B., & Choate, M. L. (1975). Early Asymptomatic Lead Exposure and Development at School Age. *Journal of Pediatrics, 87(4)*, 638-42.

[5] Canfield R, et al. (2003). Intellectual Impairment in Children with Blood Lead Concentrations Below 10 μg/dL. *Public Health Reports, 348(16)*, 1517-26.

[6] Denno D. (1990). *Biology and Violence.* New York: Cambridge University Press.

[7] Dietrich K, et al. (2001). Early Exposure to Lead and Juvenile Delinquency. *Neurotoxicology and Teratology, 23(6)*, 511-18.

[8] Fergusson, D. M., et al. (1988). A Longitudinal Study of Dentine Lead Levels, Intelligence, School Performance and Behavior – Part II, Dentine Lead and Cognitive Ability. *Journal of Child Psychology and Psychiatry and Allied Disciplines, 29 (6)*, 793-809.

[9] Fergusson, D. M., Horwood, L. J., & Lynskey, M. T. (1997). Early Dentine Lead Levels and Educational Outcomes at 18 Years. *Journal of Child Psychology and Psychiatry and Allied Disciplines, 38(4)*, 471-8.

[10] Fergusson, D.M., et al. (1988). A Longitudinal Study of Dentine Lead Levels, Intelligence, School Performance and Behavior – Part III, Dentine Lead Levels and Attention/Activity. *Journal of Child Psychology and Psychiatry and Allied Disciplines, 29(6)*, 811-24.

[11] Lanphear, B. P., et al. (2000). Cognitive Deficits Associated with Blood Lead Concentrations Below 10 μg/dL in US Children and Adolescents. *Public Health Reports, 115.*

[12] Leviton, A., et al. (1993). Pre- and Post-natal Low Level Lead Exposure and Children's Dysfunction in School. *Environmental Research, 60(1)*, 30-43.

[13] Lidsky T. and Scneider J.,(2003), Lead neurotoxicity in children: basic mechanisms and clinical correlates, *Brain*, 126:5-19.

[14] Mendelsohn A., et al. (1998). Low Level Lead Exposure and Behavior in Early Childhood. *Pediatrics, 101(3).*

[15] Needleman, H. L.et al. (1979). Deficits in Psychological and Classroom Performance of Children with Elevated Dentine Levels. *New England Journal of Medicine, 300*, 689-95.

[16] Needleman, H. L., & Bellinger, M. A. (1990). The Long-Term Effects of Exposure to Low Doses of Lead in Childhood. *New England Journal of Medicine, 322(2)*, 83-8.

[17] Needleman, H. L., & Gastonis, C. A. Low Level Lead Exposure and the IQ of Children: a Meta-analysis for Modern Studies. *Journal of the American Medical Association, 263*, 673-8.

[18] Needleman, H. L., & Bellinger, M. A. (1992). Low Level Lead Exposure, Intelligence and Academic Achievement – a Long-term Follow-up Study.

[19] Needleman, H. L.,et al.(1996). Bone Lead Levels and Delinquent Behavior. *The Journal of the American Medical Association, 275 (5)*, 365-370.

[20] Rabinowitz, M., et al. (1991). Dentine Lead and Child Intelligence in Taiwan. *Environmental Health, 46(6)*, 351-61.

[21] Sciarillo, W., et al. (1992). Lead Exposure and Child Behavior. *American Journal of Public Health, 82*, 10.

[22] Schwartz, J. (1985). Costs and Benefits of Reducing Lead from Gasoline. EPA document, Final 1984 version.

[23] Schwartz, J. (1994). Low Level Lead Exposure and Children's IQ. *Environmental Research, 65*, 42-55.

[24] Tuthill, R. (1996). Hair Lead Levels Related to Children's Classroom Attention Deficit Behavior. *Environmental Health, 51(3)*, 214.

[25] Winneke G., et al.(1990) Results from the European Multicenter Study on Lead Neurotoxicity in Children: Implications for Risk Assessment. *Neurotoxicology and Teratology, 12*, 553-59.

[26] Yule W., et al. (1981) The Relationship between Blood Lead Concentrations, Intelligence and Attainment in a School Population: A Pilot Study, *Develop. Med. Child. Neurol.*, 23, 567.

Table 1

MEAP score predictions for District Level Analysis

	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	46.864	2.724		17.201	.000
MEDINC	0.05486	.000	.068	1.630	.104
WHITEPCT	-.027	.027	-.042	-1.014	.311
LGLDPCT	-6.977	.920	-.316	-7.586	.000

a Dependent Variable: MEAP Passing Score for District

Table 2

Regression Table for School Level Analysis

	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	56.651	8.182		6.924	.000
LEADPCT5	-.281	.254	-.102	-1.106	.271
Percentage white students	-.110	.127	-.076	-.865	.389
Economically disadvantaged	-.246	.112	-.199	-2.198	.030

a Dependent Variable: MEAP Passing Rate

Table 3

Logistic Regression of School Level Variables Predicting AYP

	B	S.E.	Wald	df	Sig.	Exp(B)
ECONOMIC	.016	.021	.598	1	.439	1.017
WHITE	.023	.020	1.251	1	.263	1.023
LEADPCT5	.099	.042	5.544	1	.019	1.104
Constant	-3.546	1.620	4.788	1	.029	.029

a Variable(s) entered: ECONOMIC, WHITE, LEADPCT5

KYM L. WORTHY
PROSECUTING ATTORNEY

RICHARD P. HATHAWAY
CHIEF ASSISTANT

DONN FRESARD
CHIEF OF STAFF

COUNTY OF WAYNE
OFFICE OF THE PROSECUTING ATTORNEY
DETROIT, MICHIGAN

1200 FRANK MURPHY HALL OF JUSTICE
1441 ST. ANTOINE STREET
DETROIT, MICHIGAN 48226-2302

TEL: (313) 224-5777
FAX: (313) 224-0974

MEMORANDUM

TO: **CHILDHOOD LEAD POISONING PREVENTION AND CONTROL COMMISSIONERS:**

Carole Ann Beaman, Ph. D.
Denise O. Chambers
Joan Dyer
Daryl K. Gallant
Bruce C. Jeffries
Clay Powell
Robert D. Sills
Laurel R. Sproul
Kimberlydawn Wisdom, M.D., M.S.

FROM: **Mary DuFour Morrow, Assistant Prosecuting Attorney, Wayne County Prosecutor's Office, State Certified Lead Inspector/Risk Assessor**

RE: **LEAD-BASED PAINT PROSECUTIONS**

DATE: **OCTOBER 24, 2005**

Introduction

The purpose of this memorandum is to better acquaint the Childhood Lead Poisoning Prevention and Control Commission (Commission) with the work of the Wayne County Prosecutor's Office (Office) and its practical application of recently enacted legislation that makes it a criminal offense for landlords to knowingly rent lead-infested premises to families with minor children. MCL 333.5475a.[i]

Philosophy and Goals

At the outset, it should be noted that, in lead-based paint cases, it is neither the goal nor the philosophy of our Office to incarcerate, assess penalties, or even to secure the conviction of recalcitrant landlords. Our goal is to remediate lead hazards and prevent lead-based paint poisoning in the children of Wayne County. This is best accomplished with our Diversion Program (Diversion), which holds landlords accountable and provides the educational resources needed to prevent the landlord from unwittingly poisoning additional children.

The Diversion Program

The Wayne County Prosecutor's Office Pre-Trial Diversion Division will consider defendants who have no criminal history and who are charged with non-assaultive crimes for the program. If the defendant qualifies for the program, an individual agreement will be reached between the Office and the defendant as to what steps defendant must take to rectify his or her wrongdoing. If defendant completes the terms of the agreement in the requisite time period, the case against defendant is dismissed.

Case Histories:

Since enactment of the statute making it a criminal offense to knowingly rent lead-infested premises to families with minor children (MCL 333.5475a), our Office has sent violation notices to about two-dozen landlords. Most of the landlords who were sent notices abated the hazard without any further action on our part being necessary. Several of the landlords had previously received notices from the local health department advising them of the hazard and warning of potential fines that could be imposed if they failed to remediate. Although the landlords tended to ignore those notices, in some cases for over a year, they immediately responded to notices from our Office warning of the possibility of criminal prosecution. Thus, the statute, MCL 333.5475a, is effective in getting landlords' attention and cooperation in abating lead hazards.

Thus far, we have had to actually charge only three landlords in Wayne County. In those cases, all landlords have entered into our Diversion program and agreed to do the following to avoid a criminal conviction:

1. Hire a certified lead abatement contractor to abate the lead hazards in the charged property.

2. Pay to relocate the family during the abatement process of the charged property.
3. Provide our Office with a list of all other properties owned by landlord that house families with children under the age of six.
4. Permit Health Department Inspectors to perform risk assessments on those properties for lead-based paint hazards.
5. If lead-paint hazards are found (as they have been in every case), hire a certified lead abatement contractor to abate the hazard.
6. Pay to relocate the families in the above-mentioned properties during the abatement process.
7. Permit the Health Department to perform clearance testing on all properties before families re-occupy them.
8. Attend an 8-hour training course in lead safe work practices to, hopefully, educate the landlord to safe work practices that will prevent exposure to future children in other properties owned by defendant.

Thus far, compliance has been 100% in the Wayne County cases filed. We have not actually convicted any defendant under the new statute because all landlords charged redmediated the hazard, complied with the terms of their diversion agreement, and thus, had the case against them dismissed. We have not assessed penalties or fines in any of the cases charged under the new statute because we believe doing so harms children by diverting monies better spent on abatement activities.[ii] By requiring the defendants to disclose and permit inspection of other properties that house children under six we are, arguably, preventing the lead poisoning that would likely have occurred in the children inhabiting those hazardous properties.

It should be noted that our ability to file cases in Wayne County has been compromised by concerns with HIPAA and the disclosure of EBL-identified children. At present, we are working with the Wayne County Executive's Office and the Michigan Department of Community Health (MDCH) to resolve the issue. The Michigan Department of Community Health (MCDH) is seeking to amend their administrative rules. At present, State Administrative Rules prohibit the MCDH from disclosing EBL-identified children to any entity other than the local health departments. The proposed amendment would permit them to disclose those results directly to our Office.

Common Misperceptions

There is a misperception that landlords who take a proactive approach and test for lead-based paint hazards will expose themselves to criminal prosecution. This is not true. In fact, a landlord who tests for, and attempts to remediate, lead-based paint hazards *before* a child is identified as having an elevated blood lead level(EBL) is insulating him or her self from criminal liability. The statute, MCL 333.5475a, clearly requires the prosecutor to prove a negative, to wit, "not acted in good faith to reduce the lead paint hazards

through interim controls or abatement or a combination of interim controls and abatement."

---

[i] MCL 333.5475a provides, in pertinent part, as follows:

(1) A property manager, housing commission, or owner of a rental unit who rents or continues to rent a residential housing unit to a family with a minor child who is found to have 10 micrograms or more of lead per deciliter of venous blood is subject to the penalties provided under subsection (3) if all of the following apply:

(a) The property manager, housing commission, or owner of the rental unit has prior actual knowledge that the rental unit contains a lead-based paint hazard.
(b) At least ninety days have passed since the property manager, housing commission, or owner of the rental unit has actual knowledge of the lead paint hazard.
(c) The property manager, housing commission, or owner of the rental unit has not acted in good faith to reduce the lead paint hazards through interim controls or abatement or a combination of interim controls and abatement.

(2) A property manager, housing commission, or owner of the rental unit is presumed to have prior actual knowledge that a unit contains a lead-based paint hazard only if 1 of the following applies:

(a) The property manager, housing commission, or owner of the rental unit signed an acknowledgement of the hazard as a result of a risk assessment under this chapter at the time the risk assessment was made.
(b) The property manager, housing commission, or owner of the rental unit was served as a result of a risk assessment under this chapter with notice of the hazard by first-class mail and a return receipt of this service was obtained.

(3) A property manager, housing commission, or owner of the rental unit convicted of violating this section is guilty of a crime as follows:

(a) Except as provided in subdivision (b), the property manager, housing commission, or owner of the rental unit is guilty of a misdemeanor punishable by imprisonment for not more than 93 days or a fine of not more than $5,000.00, or both.
(b) If the property manager, housing commission, or owner of the rental unit was previously convicted of violating this section or a local ordinance substantially corresponding to this section, the property manager, housing commission, or owner of the rental unit is guilty of a misdemeanor punishable by imprisonment for not more than 93 days or a fine of not more than $10,000.00 or both.

(4) The property manager, housing commission, or owner of the rental unit may assert one or more of the following as an affirmative defense in a prosecution of violating this section, and has the burden of proof on that defense by a preponderance of the evidence:
(i) That the property manager, housing commission, or owner of the rental unit requested or contracted with a person having responsibility for maintaining the rental unit to reduce the hazard through interim controls or abatement and reasonably expected that the hazard would be reduced.
(j) That the tenant would not allow entry into or upon the premises where the hazard is located or otherwise interfered with correcting the hazard.

(5) As used in this section:
(a) "Property manager" means a person who engages in property management as defined in section 2521 of the occupational code, 1980 PA 299, MCL 339.2501.

(b) "Lead-based paint hazard" means that term as defined in section 5458 of public health code, 1978 PA 368, MCL 333.5458.

[ii] In October of 2004, our Office did assess a fine in one case that predated MCL 333.5475a. In that case, the fine was directed to the Wayne County Environmental Trust Fund where it could be used to pay for abatement activities.

CLEARCorps/Detroit
11148 Harper Avenue • Detroit, Michigan 48213
313 924-4000 • 313 924-4003 (fax)
www.clearcorps.org

Testimony to the Childhood Lead Poisoning Prevention
and Control Commission
October 24, 2005

Good Afternoon. My name is Mary Sue Schottenfels and I am the director of two community based lead poisoning prevention programs in Detroit—CLEARCorps/Detroit and LEAP Detroit. As you know, lead poisoning is a very, very serious health concern for Detroit children, as it is for children in several urban and rural areas of the State of Michigan. In Michigan as a whole, less than 2% of children under 6 are lead poisoned. In Detroit, triple that number, or 6%, have elevated lead levels. And on Detroit's eastside, where we concentrate our efforts, close to one in five, or 20% of children under 6, are lead poisoned.

Of course, we all know about the devastating effects of lead poisoning on an individual child. Children that have lowered IQ, slowed learning and speech acquisition, and hyperactivity have much less chance of succeeding in school or in life. Children who have been lead poisoned are seven times more likely to drop out of school. And the impact on the community as a whole is no less devastating. Schools are faced with children who can't learn at the same rate as other children, who are often frustrated and disruptive. Parents are called away from jobs as children act out. Employers are faced with potential workers who are ill equipped. And society as a whole pays the cost via special education costs and incarceration costs.

So what do we do as a society and what can this Commission do??

First of all, we as CLEARCorps and LEAP Detroit firmly believe that there are several strategies that together can make real progress towards solving the lead poisoning crisis.

1) We need additional dollars to make housing lead safe. There is no question that the number one solution to having a lead safe community is having lead safe housing. The Commission should support increased funding for lead hazard remediation through

Funded by BASF Corporation, US Department of Housing and Urban Development, Michigan Department of Community Health

funding sources such as the Healthy Michigan Fund and other discretionary funding sources. The Lead Hazard Remediation Program managed by Wesley Priem is an exemplary program, efficiently run, creative and collaborative. This program should receive increased funding to assure that the state's housing stock is made lead safe.

2) We need to assure that training opportunities increase throughout the State. Contractors, home renovators, landlords, homeowners, all need to understand and commit to remodel and renovate properties in a lead safe manner. Improper renovating is a major danger for children in our State. CLEARCorps and LEAP Detroit, just last week, sponsored such a training, which was attended by over 50 participants. The Commission should call for such trainings throughout the State.

3) We need additional funding for interim control programs such as CLEARCorps and Leadbusters in Detroit, and similar programs throughout the State. These programs provide an invaluable rapid response to families with lead poisoned children…working hand in hand with the Detroit Department of Health and Wellness Promotion to respond as soon as a child's elevated lead level is discovered. These programs provide hands-on parent training in making the home safer, cleaning instructions, a free cleaning kit, and a super clean and low level interim controls such as reconditioning window wells. Until we have enough lead free housing--working with parents and property owners, empowering them with the tools they need, is imperative.

4) We need to make property owners a part of the solution. As you have heard, Michigan now has a law, which holds property owners liable if and when they knowingly rent a property with lead hazards to a family with children under six. We also have strong ordinances within the Detroit Health Code. These laws and ordinances can serve as the proverbial 'stick'. Within the LEAP Detroit Program, we have just created the 'carrot'. Our new program, LOAN Plus, has formed a partnership with the MSHDA and the Department of Community Health Lead Hazard Reduction Program, to offer a free Risk Assessment, small grant, and low interest loan to property owners who are willing to address the lead hazards in their unit. We have already had 89 inquiries about this program. We believe that this

model could be used throughout the State to bring property owners into the mix as a part of the solution.

5) We need to implement the Lead Addressed Homes Registry recently called for in State legislation. LEAP Detroit has started such a registry and has gathered information about over 2000 properties. This data will be uploaded to the State of Michigan Registry when it is completed. The Registry will be an invaluable tool.

6) There are innumerable other strategies that must be implemented such as more community education, increased testing, increased compliance by Medicaid providers, and indeed by medical providers in general. The people of the State of Michigan, the legislators, policy makers, and general populace need to understand the consequences and impacts of this health crisis.

In conclusion, I would like to say on behalf of the CLEARCorps and LEAP Detroit staff and team, that we strongly encourage you, as the Childhood Lead Poisoning Prevention and Control Commission, to use the bully pulpit that you have, to make sure that Michigan has awareness and funding needed to solve the lead poisoning prevention crisis and to assure that generations of Michigan children still to come are safe and have the best chance to meet their potential as citizens of Michigan and the world.

Thank you for your time and your commitment to this important issue.

The Arc of Bay County

709 Columbus Ave.
Bay City, MI 48708

Phone (989) 893-1346
Fax (989) 893-1458

October 4, 2005

TO: Childhood Lead Poisoning Prevention and Control Commission
FROM: Richard L. Davis, The Arc of Bay County
SUBJECT: Testimony on Lead Poisoning Prevention

For many years, we have known that childhood lead poisoning was a danger in this state and nation. Unfortunately, it has taken the state of Michigan this long to do something about it.

Lead based paint has been the prime culprit in children being poisoned by lead, this is especially true in older neighborhoods where many poor children live.

Prime Time TV ads can do much to make the public and parents aware of the danger to children who live in homes painted prior to WWII and there is paint chipping that these children can ingest.

Local building inspectors should be made aware of the danger of lead poisoning and make the owner of any building that they may inspect for other reasons, aware of the potential harm to children.

Local councils or commissions should include in their building ordnances rules for covering or removing lead based paint.

Blood lead testing of children must be increased and a registry established.

Every citizen of the state needs to know of this complex and devastating public health problem that we have. Education is the key factor that we have to eliminate childhood lead poisoning in all localities of this state. We will also need the cooperation and collaboration of public and private entities within our communities.

I wish to thank you for offering the opportunity for me to express my views on this very important matter.

Respectfully,

Richard L. Davis

Detroit Lead Partnership

Testimony to the
Childhood Lead Poisoning Prevention and Control Commission
Presented by Teresa Holtrop MD, Co-chair, Detroit Lead Partnership
October 24, 2005

Good Afternoon. My name is Dr. Teresa Holtrop. I am a pediatrician and co-chair of the Detroit Lead Partnership. The Detroit Lead Partnership is an unincorporated association, in existence since 1999, whose mission is to facilitate coordination, advocate for, and monitor the progress of efforts to prevent and eliminate lead poisoning in the children of Detroit. Several of our participating members are here today and will be or have already presented testimony on behalf of their individual organizations.

Detroit has the highest prevalence of lead poisoned children in the whole state. Despite modest success in bringing down the number of children who are annually lead poisoned, we continue to identify way too many children, with almost 2000 Detroit children identified in 2004 alone. Our difficulties in successfully addressing this issue lies in the complexity of the problem at hand and requires ongoing and concerted collaboration amongst numerous governmental and non-governmental agencies and individuals. I wish to highlight a few points that jump out.

1. Detroit, in contrast to many other large urban centers across the country, has a large number of rental units that are owned by individuals who own no more than 4 units each. This makes addressing lead poisoning through pressure on landlords much more difficult than in cities where large management corporations are responsible for many rental units at a time.
2. We need to find a carrot and stick approach to effectively reach such landlords. Our HUD-Funded Lead Elimination Action Program (LEAP)'s Loan Plus program is such a carrot, whereby some lead hazard control funding is offered as a grant while the rest is offered as a low interest loan. The stick needs to come from enhanced local and statewide code enforcement measures. Other states, Indiana being one, have developed successful carrot/stick approaches.
3. Pressure on landlords to keep their homes up to code is essential but must be done in such a way as to assure that landlords do not view lead remediation as outrageously punitive and financially unprofitable, nor feel that liability issues make renting too difficult. We need to be sure that affordable housing stock remains available and that liability issues do not cause landlords to abandon more housing than they already have, making it even harder than it currently is for our low-income families to find a place to live.
4. We need to engage home repair supply stores to become actively involved in providing training and information about lead safe work practices to home remodelers who perhaps are working on upgrading their homes but are not licensed contractors and only have

4. **(cont.)** limited knowledge on how to go about doing so safely. I recall the father of two children I cared for several years ago who had recently bought a very dilapidated house and planned on renovating it himself. His children already had lead poisoning but he was not convinced of the urgency because he couldn't see the effects and had not received sufficient information about the potential dangers to take the problem seriously. He was also not about to listen to this female doc who couldn't possibly understand anything about home remodeling. Or, as another example, I would like to cite that of my mother who lives one block over from this building, who several years ago hired my brother-in-law who had experience in construction but was not a licensed builder, to sand down the walls in the basement laundry. Not thinking things through carefully, he did so without taping off the room which was located right next to the furnace room. The furnace sucked the dust through the whole house and my mother suddenly thought about the danger of lead containing paint, had the dust tested and discovered that the lead levels were sky high. My 4 nieces and nephews, all under age 6, lived next door and now could not visit until the whole house had been cleaned up thoroughly by professionals, a nightmare that my mother still shudders about when reminded of it. I present these stories as examples of how easy it is to contaminate living areas with lead dust, and how important education, outreach and intervention resources for individual home remodelers are. There are grassroots organizations in many of our cities who are on the ground and willing to take an active part in partnering with local home repair stores.
5. We need to continue to work on increasing awareness of lead poisoning prevention methods through neighborhood education. The Lead Partnership has actively engaged in door-to-door outreach by delivering flyers and other educational materials into neighborhoods at particularly high risk for lead poisoning. We hope that by educating folks who may come in contact with young children and lead containing housing, we will increase the general public's awareness of the dangers at hand and make lead poisoning prevention an activity that is taken on by the community as a whole, not just by individual organizations.

Finally, I want to add a point about the proposed MCIR/lead database interface, not in my capacity as co-chair of the Detroit Lead Partnership but as an individual pediatrician. While I very much see the benefit of making lead levels available to health care providers, I cannot but worry about the potential for labeling children if lead levels become available to a broader public. I understand that the current proposal seeks to limit access to only health care providers but I wish to point out that over the past few months, the State of Michigan has instituted a marriage between the Student Immunization Registry (SIRS) and MCIR. Immunization records in MCIR will now be available to school personnel. No one has yet been able to tell me whether the proposed link to the lead database will also be visible to the schools but I strongly urge that this be restricted. I remind the Commission of the Pygmalion Effect, described so eloquently in the book "Pygmalion in the Classroom", a book that describes the effects of prejudicing teachers about the abilities of their students by giving some of them correct and others incorrect information about their students. The students responded to the expectations of

the teachers and performed better when met with higher expectations and worse when lower expectations were present, no matter what their underlying ability was. I realize that we already provide lead result data to Head Start programs. However, making this same data available to school teachers at a time when we do not yet have adequate educational intervention methods specifically addressing the inattention and hyperactivity associated with early lead poisoning serves no purpose.

Thank you very much.

Statewide Commission on Lead Poisoning
October 24, 2005

Good Afternoon, my name is Valerie Monet and I am a researcher at the Center for Urban Studies at Wayne State University. For the past several years we have been working with local, non-profit, and state agencies on studies in the area of Childhood Lead Poisoning. Our goal is to provide practical research that will result in improved policies and service provision.

Today I am here to stress the important role that education and outreach plays in preventing childhood lead poisoning. In the state of Michigan our long-term goal is to prevent any child from ever being exposed to lead and becoming poisoned. This move to primary prevention is key to eliminating childhood lead poisoning. However, due to the age of housing and the quality of housing stock that exists in many high risk areas, it is going to take a while before all lead hazards are remediated. This means that even though we are doing more and more abatement work each year, children will continue to be exposed. This is why it's so important that families know how to reduce the risk of exposure in their own home and what steps will reduce the likelihood that their child will become lead poisoned. The main way that they become informed is through state and local education and outreach efforts.

At the Center we conduct a statewide survey multiple times each year. Random digit dialing is used to ask questions of residents across the state of Michigan on multiple issues. Samples are stratified and counties are represented proportionately. This past summer we asked a set of questions assessing residents' knowledge of lead poisoning on the most recent Statewide Survey. This test of knowledge is based on similar studies done in Chicago and New Orleans. In those cities the test was used to assess the effectiveness of local lead education programs. We modified it slightly and applied on a broader level to the state as a whole. The results of this test were very surprising.

The final questionnaire consisted of 23 true/false/ don't know questions across 4 core content areas. Those areas were general knowledge about lead, lead poisoning prevention practices, lead exposure sources, and nutrition. We had 733 people participate in this study. 8% were from the city of Detroit and 92% were from some other area of the state. Over of those who took part in the study reported that they had children and over 90% told us they had some knowledge of what lead poisoning was.

If we were to take the questions we asked and grade it like a quiz the average score was a 57% (the median was 57% as well). If we were to look at this as a letter grade it would be a D. Although the score were generally low, they did vary across the core content areas. People had the most amount of knowledge in the area of exposure sources. In this area they would have received a 74% or C. Respondents generally knew that lead paint and lead dust were the main exposure source for children. However, fewer respondents reported correct answers with regard to exposure through water, soil, pottery, or folk remedies.

Participants got a D+ (68%) when it came to general lead knowledge. This area included questions like when a child should be tested and what symptoms of lead poisoning exist. The good thing is that the majority of respondents knew that lead poisoning has adverse affects on a child's ability to learn. Over two-thirds of study participants knew that symptoms were not always visible. Also, over two-thirds knew that landlords were required by law to tell their tenants if they knew lead hazards were present on their properties. However, less than half of all respondents knew when a child should be tested for lead. The fact that people are unsure of when their child should be tested should be a giant red flag.

Results were weaker in the area of lead poisoning prevention practices. The score in this area was 54% which is failing. A good point is that over three-quarters of respondents knew they could bring lead hazards in their home if they worked with lead in their occupation or hobby. But, individuals did not have a good understanding of how to reduce lead hazards in water. In this category there were a higher percentage of respondents indicating they did not know the correct answer.

Probably the most surprising part of this study was in the area of nutrition. The average score was 14%. Residents had least amount of knowledge in the area of nutrition than any other content area. The vast majority of participants did not have a good understanding of the role nutrition plays in decreasing the likelihood a child will become lead poisoned. This also begs the question of how comprehensive their knowledge is on what good nutrition is.

The data was analyzed across several demographic variables. Generally these results remained consistent across geographic location and education level. Score were generally the same when data was analyzed for people who had children; however, in cases where they were different the scores were actually lower. The one notable difference is that we found a significant association between knowledge and income. The more money people make, the more they seem to know about lead poisoning. This too should be a red flag, as outreach efforts are generally done to groups of a lower socioeconomic status.

We asked several other questions that we don't really have time to dive into today, but I thought it was important to mention that when asked about where people got their information about lead poisoning they were not saying it was from a doctor or nurse. In our study, more people reported getting information from the internet or friends than doctors offices and health departments combined.

To sum things up, although people seem to understand that lead poisoning is a problem for the state as a whole, the answers given indicate they don't necessarily think there is a problem unless they visibly see paint chips. To make things worse, their knowledge of how to prevent exposure is generally low. To help improve education efforts I would advise increasing, or at least keeping funding levels consistent and stressing the role of nutrition and prevention methods families can use at home to reduce the chance their

child is poisoned. I would also recommend continuing to reach out to those groups that are most at risk.

Michigan Chapter
National Association of Pediatric Nurse Practitioners

October 28, 2005

As Pediatric Nurse Practitioners, we always assess children at high risk and the Medicaid population for lead screening. We start as a rule at the 12 month check up. However, if the children are in the WIC program, they are usually screened for lead along with their hemoglobin levels. We also refer appropriately when the lead levels come back elevated. We follow the proper protocol for reassessing the lead levels.

The suggestion that the lead levels be included into the MICR program is a good one: Lead re-screens can be flagged to alert the office staff of the need to obtain another sample. Of course, sometimes, this needs to be done on a visit when the opportunity arises and not on the scheduled visit.

Our suggestion is to teach the parents about lead screens and protecting their children when the children are first born at the hospital. This is an opportunistic time when mom and child are not going anywhere for 24-48 hours. The parents would watch a video and have their questions answered by an educator who has received training specific to lead.

I have a comment regarding the rentals that the parents live in who are on assistance. The people who receive monies from Section 8 program have to have their living quarters approved and checked for peeling paint and other safety issues. If the people who check the residences approve them, then the children and family are safe. I am not well versed on people who receive assistance from other programs, but maybe they should also be checking residences before people move in.

Another suggestion would be to have an office in-service to update the staff, both providers and ancillary staff, on issues pertaining to lead.

Sincerely,

Mary A. Targosz, President
MI Chapter of NAPNAP

STATE OF MICHIGAN
STATE BOARD OF EDUCATION
LANSING

JENNIFER M. GRANHOLM
GOVERNOR

MICHIGAN Department of Education

MICHAEL P. FLANAGAN
SUPERINTENDENT OF
PUBLIC INSTRUCTION

October 20, 2005

Childhood Lead Poisoning Prevention and Control Commission
c/o Health Management Associates
120 North Washington Square, Suite 705
Lansing, MI 48933

Re: Public hearing testimony

The State Board of Education is pleased to be able to present testimony to the Childhood Lead Poisoning Prevention and Control Commission. Lead poisoning not only touches the families and students that we serve, but directly affects the classrooms and buildings across the state that we support. As a tangible sign of our appreciation of the work of the Commission, this letter summarizes how lead poisoning adversely affects the work of educators in supporting Michigan students and families, and will describe ways in which the Board and Department of Education will continue to support statewide prevention efforts, and work collaboratively with the Departments of Community Health and Human Services to accomplish the goal.

As educators, we are becoming increasingly aware of the impact of lead levels on children's academic achievement and behavior. Studies have shown that even low blood lead levels have been linked with lifelong learning disabilities, aggressive behavior, and attention-deficit disorders. Although prevention efforts focus on pre-school aged children, education systems receive all children and the conditions in which they arrive. In the education environment, lead poisoning may impact areas such as classroom learning, behavior management, special education programs, and early childhood programs, to name a few.

Representing the State Board of Education and the Michigan Department of Education, Kim Kovalchick, Education Consultant, Coordinated School Health and Safety Program, has actively served on the statewide Childhood Lead Poisoning Prevention Program advisory committee and on the 2003 Governor's Task Force on the Prevention of Childhood Lead Poisoning.

608 WEST ALLEGAN STREET • P.O. BOX 30008 • LANSING, MICHIGAN 48909
www.michigan.gov/mde • (517) 373-3324

In addition, several Michigan Department of Education programs and initiatives contribute to the foundation for healthy schools, communities and families which support efforts such as lead poisoning prevention. These include:

- Coordinated School Health and Safety Programs
- Safe and Bully-Free Schools initiatives
- Covering All Kids (a Medicaid participation initiative)
- Early Childhood and Parenting Programs
- Special Education and Early Intervention Services
- Food and Nutrition Programs

The State Board of Education encourages continued, statewide efforts to increase the rates of lead testing for high risk children under six years old; and the improvement of safe and lead-free housing options for families. In addition to the participation on the advisory committee and task force, the State Board will continue to support lead poisoning prevention efforts of the Department.

Kathleen N. Straus
President

STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
LANSING

JENNIFER M. GRANHOLM
GOVERNOR

STEVEN E. CHESTER
DIRECTOR

October 31, 2005

Dr. Kimberlydawn Wisdom, MD, MS, Chairperson
Childhood Lead Poisoning Prevention and Control Commission
c/o Health Management Associates
120 North Washington Square, Suite 705
Lansing, MI 48933

Dear Dr. Wisdom:

SUBJECT: Department of Environmental Quality Testimony

Thank you for this opportunity to provide the Department of Environmental Quality's (DEQ) perspectives regarding our shared commitment to the control or elimination of the hazards to Michigan's children posed by exposures to lead.

The DEQ has long recognized the environmental and public health threats that can result from exposure to lead and has consistently sought to identify and control those exposures through the administration of its diverse environmental protection programs. Through these efforts, the DEQ has accomplished many notable improvements. Through its air and water discharge permitting programs, the DEQ has imposed strict limits on the discharge of lead and lead-containing compounds to Michigan's environment. Through its regulation of solid and hazardous wastes, the DEQ has assured that lead containing wastes are properly managed, transported, and disposed of, such that unacceptable exposures do not result. Through its pollution prevention programs, the DEQ has worked to assist Michigan's industries to identify alternative materials and processes that reduce or eliminate the use of lead-containing compounds and the resultant waste streams.

The DEQ has also participated in innovative approaches to help assure that lead contamination is properly managed. In April 2005, the DEQ entered into a Memorandum of Understanding with the Michigan United Conservation Clubs to create the Michigan Shooting Range Stewardship Program. This program provides resources and support to assist shooting range operators in environmentally sound range management practices and provides for follow-through to assess the success of those practices, while preserving all of the DEQ regulatory authorities to require more aggressive steps to respond to unacceptable environmental conditions at shooting ranges. In addition, the DEQ has worked to provide education and outreach in a variety of ways including; public meetings, workshops, and web-based resources.

The DEQ has, both independently and in conjunction with the United States Environmental Protection Agency, investigated and remediated significant lead contamination at several sites in the Detroit area, including the Master Metals site, the Helen Avenue site, and the 7742 Davison Avenue site. At each of these sites, substantial investigation and remediation work was performed to remove lead-contaminated soils and restore residential properties that had been impacted by historical lead emissions.

Finally, the DEQ continues to pursue its ongoing assessment of known and suspected historical lead smelter sites in the City of Detroit. This assessment identified ten sites which are being evaluated in phases to determine whether on- or off-site impacts have resulted from historical lead smelting operations. This effort has resulted in the identification of two areas where historical smelting could have impacted nearby residential areas. In one case, lead impacts were identified that are clearly indicative of releases from a historical smelter site. In the other, investigation ultimately revealed that although lead contamination was identified on some residential properties, it was not the consequence of lead smelting activities. The DEQ intends to seek resources to perform remedial actions in the first instance, but is unlikely to be able to perform such actions in the second.

While the DEQ is justifiably proud of its accomplishments, significant challenges remain. Some of these challenges arise from the legacy of the ubiquitous historical use of lead and lead compounds. These multiple, overlapping sources can make it extraordinarily difficult to accurately identify those sources of lead contamination that are subject to the DEQ regulatory authorities. In addition, the sheer magnitude of the problem poses significant challenges, as exemplified by the fact that the DEQ's efforts to identify lead smelter sites have been limited almost entirely to the City of Detroit although it is clear that such sites are likely to have existed in many of Michigan's cities.

Not surprisingly, the underlying challenge is simply one of resources. The identification and remediation of sites of environmental contamination is complex and costly, both in terms of human and financial resources. In the first smelter site example noted above, remedial costs are currently estimated to approach $4 Million, and may be more. In 2003, the DEQ sought additional human and financial resources to support its efforts to identify and remediate sites of lead contamination, but due to a variety of budgetary challenges was unsuccessful in obtaining those resources. It is also important to note that this resource issue affects far more than the lead smelter sites. For the last several years, the DEQ's funding for its cleanup program has been steadily diminishing and is now nearly depleted. This funding has not been replaced. The DEQ has used these funds to perform work at well over 1000 sites across the state and dozens of new sites requiring public-funded cleanup are identified each year. As a result of the funding shortfall, the DEQ does not have the ability to fund work at all of the current publicly-funded sites, and decisions to fund new sites will come at the expense of other cleanup projects. The DEQ is carefully prioritizing all publicly-funded sites to assure that its limited funds are directed to those sites that pose the greatest risks of exposure, and to assure that existing remedial systems continue to be operated and maintained. This

means that work at many sites will not receive funding – including sites where ongoing work will need to be stopped. The DEQ is engaged in the process of identifying new, stable long-term funding sources for its cleanup program, but until that is accomplished, the need to carefully prioritize cleanup work will remain.

The DEQ is sensitive to the fact that everyone involved in this effort is faced with significant resource challenges. The DEQ will continue to do all that it can within the limitations it faces, but believes that more must be done. Nonetheless, any more aggressive response to the challenges posed by lead-contaminated sites will require resources commensurate to that effort.

Thank you again for the opportunity to offer these perspectives for the Commission's consideration. If you or the Commission members have any questions, or require any additional information, please contact Mr. Philip L. Schrantz, Chief, Field Operations Section, Remediation and Redevelopment Division at 517-241-7706, or you may contact me.

Sincerely,

Jim Sygo
Deputy Director
517-373-7917

cc: Mr. Steven E. Chester, Director, DEQ
Mr. Andrew W. Hogarth, DEQ
Mr. Philip L. Schrantz, DEQ
Ms. Christine Flaga, DEQ